American Physical Society

66th Annual Meeting

Division of Fluid Dynamics

DFD '13
PITTSBURGH

24 – 26 November 2013

Pittsburgh, Pennsylvania

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UNIVERSITY OF PITTSBURGH

Northeastern University

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APS physics

Meeting Schedule-at-a-Glance

Sunday, 24 November		
08:00 – 09:57	Session A: Concurrent Sessions	Convention Center, Session Rooms
09:57 – 10:25	Refreshment Break – Résumé Help Desk Open	Convention Center, Exhibit Hall A
10:25 – 12:20	Session B: Awards Presentation followed by Otto Laporte Lecture and Corrsin Award Lecture	Convention Center, Spirit of Pittsburgh Ballroom
12:20 – 13:35	Lunch (on your own)	
12:25 – 13:25	Young Investigator Workshop	Westin, Westmoreland Room
13:35 – 14:10	Session C: Invited Lectures	Convention Center, Spirit of Pittsburgh Ballroom
14:10 – 14:15	Minibreak	
14:15 – 16:25	Session D: Concurrent Sessions	Convention Center, Session Rooms
16:25 – 16:45	Refreshment Break – Résumé Help Desk Open	Convention Center, Exhibit Hall A
16:45 – 18:03	Session E: Concurrent Sessions (Note: Apker Award Lecture E3.00005 at 17:37, Convention Center, Room 325)	Convention Center, Session Rooms
18:15 – 19:00	Session 1A: Student Poster Session	Convention Center, South Terrace Foyer
18:15 – 19:00	Session 1B: Poster Session	Convention Center, Spirit of Pittsburgh Ballroom Gallery
19:00 – 21:30	APS/DFD Reception	Convention Center, Noresco Riverside Terrace & Exhibit Hall A
Monday, 25 November		
08:00 – 10:10	Session G: Concurrent Sessions	Convention Center, Session Rooms
10:10 – 10:30	Refreshment Break – Résumé Help Desk Open	Convention Center, Exhibit Hall A
10:30 – 12:40	Session H: Concurrent Sessions	Convention Center, Session Rooms
12:40 – 14:00	Lunch (on your own)	
12:45 – 13:45	Student Lunch	Westin, Westmoreland Room
12:45 – 13:45	Fluids Education Lunch Workshop: Simple In-Class Active Learning Activities	Westin, Cambria Room (West)
12:45 – 14:00	Women in Fluids Network Lunch	Sonoma Grille (Located 2 blocks from Center)
14:00 – 14:35	Session J: Invited Lectures	Convention Center, Spirit of Pittsburgh Ballroom
14:35 – 14:40	Minibreak	
14:40 – 15:15	Session K: Invited Lectures	Convention Center, Spirit of Pittsburgh Ballroom
15:15 – 15:35	Refreshment Break – Résumé Help Desk Open	Convention Center, Exhibit Hall A
15:25	Announcement of Gallery of Fluid Motion Award Winners and Poster Session Competition Winners	Convention Center, Exhibit Hall A
15:35 – 18:11	Session L: Concurrent Sessions	Convention Center, Session Rooms
17:00 – 18:30	Meet the APS Journal Editors Reception	Convention Center, West Atrium (Third Floor)
19:00 – 20:30	Geophysical Fluid Dynamics Reception	Westin, Pennsylvania Ballroom
Tuesday, 26 November		
08:00 – 10:10	Session M: Concurrent Sessions	Convention Center, Session Rooms
10:10 – 10:30	Refreshment Break – Résumé Help Desk Open	Convention Center, Exhibit Hall A
10:30 – 11:05	Session N: Invited Lectures	Convention Center, Spirit of Pittsburgh Ballroom
11:05 – 11:10	Minibreak	
11:10 – 11:30	Session P: Invited Lectures (Andreas Acrivos Dissertation Award Lecture and François N. Frenkiel Award Lecture)	Convention Center, Spirit of Pittsburgh Ballroom A and Spirit of Pittsburgh Ballroom B/C
11:30 – 13:05	Lunch (on your own)	
13:05 – 15:41	Session R: Concurrent Sessions	Convention Center, Session Rooms

Free WiFi is available in Exhibit Hall A. The network is: APS2013. The password is: DFD2013

66th Annual Meeting of the Division of Fluid Dynamics

24 – 26 November 2013 **Pittsburgh, PA**

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Cover photo: Courtesy of Mehdi B. Nik

Welcome

On behalf of the Local Organizing Committee, we welcome you to the 66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics (DFD)! After more than six decades of successful and continuously growing meetings across the United States, we are very excited to host the 2013 DFD meeting in Pittsburgh, Pennsylvania.

Since the first annual meeting of the DFD hosted by the Naval Ordnance Laboratory in White Oak, Maryland, this gathering has developed into one of the largest meetings in fluid dynamics worldwide. This year, our technical program includes a record of nearly 2,300 contributed abstracts in 34 parallel sessions and 128 entries to the Gallery of Fluid Motion. We look forward to 119 technical posters of which 48 student posters will be judged and best poster prizes will be awarded during the meeting.

In addition to the numerous contributed presentations, we look forward to this year's awards and invited lectures, as well as minisymposia and focus session presentations on a few selected topics in fluid dynamics. We also welcome other special programs including our Student Lunch, Young Investigator Workshop, Fluids Education Lunch Workshop, and the Résumé Help Desk, to name a few.

A sincere thank you goes out to all involved with the coordination of this meeting. We particularly acknowledge the various contributions of faculty, staff and students of the various universities involved, as well as those of Peggy Holland and Monica Malouf of Meetings and More who provided invaluable expertise and assistance without which the organization of this meeting would not have been possible. We are also grateful to Donald Mewha from the American Physical Society for his valuable help and patience in handling the numerous abstracts submitted to the meeting.

On behalf of our colleagues on the Organizing Committee, we wish you a very productive and enjoyable meeting and a pleasant stay in Pittsburgh.

Nadine Aubry and Peyman Givi
on behalf of the Local Organizing Committee

66th Annual Meeting Committee

University of Pittsburgh

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Paolo Zunino *(Mechanical Engineering & Materials Science)*

We are especially indebted to the Administration of the Swanson School of Engineering at the University of Pittsburgh for all of their support.

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Shawn Litster *(Mechanical Engineering)*
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Kerem Pekkan *(Biomedical Engineering, Mechanical Engineering)*
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Meeting Logistics

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Division Website Development Officer

Jeff Eldredge

Gallery of Fluid Motion Coordinator

Ken Kiger

Useful Information

All events will be held at the David L. Lawrence Convention Center or the Westin Pittsburgh as noted under the event description.

Registration Desk Hours
Convention Center, Exhibit Hall A

Saturday, 23 November	13:00 – 20:00
Sunday, 24 November	07:00 – 17:00
Monday, 25 November	07:30 – 17:00
Tuesday, 26 November	07:30 – 15:00

Coat Check Hours

Sunday, 24 November	07:00 – 22:00
Monday, 25 November	07:30 – 19:00
Tuesday, 26 November	07:30 – 16:30

Child Care Grants, Travel Awards and Certificate of Attendance

If you are a recipient of a Child Care Grant, Travel Award or need a Certificate of Attendance, please go to the APS/DFD Information Desk located at registration.

Speaker Ready Room Hours
Convention Center, Room 309

Saturday, 23 November	13:00 – 20:00
Sunday, 24 November	07:00 – 18:15
Monday, 25 November	07:30 – 18:15
Tuesday, 26 November	07:30 – 14:00

Exhibits and Gallery of Fluid Motion Hours
Convention Center, Exhibit Hall A

Sunday, 24 November	07:00 – 17:00 AND 19:00 – 21:30
Monday, 25 November	07:30 – 17:00
Tuesday, 26 November	07:30 – 11:00

The Exhibit Hall showcases products from industry and government sponsors. Please refer to the list of exhibitors starting on page 26. Please look at the Gallery of Fluid Motion Poster and Video Listings found on pages 19–25.

Wireless Internet
(Sunday – Tuesday)
Convention Center, Exhibit Hall A

A complimentary wireless “hotspot” is provided by the Swanson School of Engineering and its Laboratory for Computational Transport Phenomena at the University of Pittsburgh. Complimentary service will be provided in Exhibit Hall A of the Convention Center where exhibits are held. Click on **APS2013** to gain access. The password is: **DFD2013.**

The Convention Center also provides wireless internet connection in other areas of the building for a fee.

Résumé Help Desk
Sunday – Tuesday (during refreshment breaks)
Convention Center, Exhibit Hall A

Are you ready to apply for faculty, postdoc and research positions? Members of the DFD experienced in hiring would like to help you out by taking a look at your C.V. and a sample cover letter or research/teaching statements. We can give you tips about most effectively presenting yourself in today's extremely competitive job market. How will you stand out from hundreds of other applicants? Make sure your résumé isn't what's holding you back! The table will be staffed during the coffee breaks, and there will be a sign-up sheet **at the desk** for other appointment times.

Instructions to Speakers and Session Chairs
See page 17

Instructions for All Poster Session Set Ups
Gallery of Fluid Motion Posters, Student Poster Session 1A and Poster Session 1B
See page 18

Other Events

Sunday, 24 November

Young Investigator Workshop
FREE TICKETED EVENT
Sunday, 24 November, 12:25 – 13:25
Westin, Westmoreland Room
Supported by University of Pittsburgh, Northeastern University and Youngstown State University.

Contact: Professors Reza Sheikhi (sheikhi@neu.edu) and Hazel Marie (hmarie@ysu.edu)

Program directors from several government agencies will lead a luncheon discussion on their agencies' programs for early career researchers. To attend this free workshop/lunch, you must be registered for the meeting and be eligible for at least one of the awards. Space is limited and attendees are required to signup in advance by completing the luncheon registration form at: www.apsdfd2013.pitt.edu/luncheon-register. Eligibility requirements and additional information on some of these programs can be found at: http://tinyurl.com/NSF-CAREER, http://tinyurl.com/AFOSR-YIP, and http://tinyurl.com/ONR-YIP.

Student Poster Session (1A) and Poster Session (1B)
Sunday, 24 November, 18:15 – 19:00
Convention Center, South Terrace Foyer (1A) and Spirit of Pittsburgh Gallery (1B)

Please join us for a beverage at the APS/DFD Poster Session and Student Poster Session which will be held Sunday prior to the APS/DFD reception. Student posters will be judged and awarded 1st and 2nd prize for "Best Poster" in several categories. Winners in each category will receive awards and be noted in the DFD newsletter. This is an opportunity for graduate and undergraduate students to enhance their presentation skills and build their professional network. Winners will be announced Monday at 15:25 during the afternoon refreshment break in Exhibit Hall A.

APS/DFD Reception
Sunday, 24 November, 19:00 – 21:30
Convention Center, Noresco Riverside Terrace & Exhibit Hall A

Come visit with colleagues and interact with others in the field at a reception overlooking the Allegheny River. Always a highlight of the meeting, this reception is included in the registration fee for those who register as APS Members, Nonmembers, Graduate Students, and Retired Members. Additional tickets may be purchased for $85 each.

Other Events

Monday, 25 November

Student Lunch – FREE TICKETED EVENT
Monday, 25 November, 12:45 – 13:45
Westin, Westmoreland Room
Organized by: Shelley Anna, Carnegie Mellon University, Martina Bukac, University of Pittsburgh and Ismail Celik, West Virginia University
Supported by the Swanson School of Engineering and its Laboratory for Computational Transport Phenomena at the University of Pittsburgh and the Fluid Dynamics Research Consortium at Penn State University

Students attending the meeting will have the opportunity to participate in a discussion with an expert on topics of interest. Each expert will host an informal discussion over a complimentary lunch. The luncheon will begin promptly at 12:45. Interested students must be signed up in advance to attend. Check at the APS/DFD Information Desk if you would like to attend but have not signed up. For additional information, contact Shelley Anna at sanna@cmu.edu. The experts and their areas of interest are as follows:

1. **William Layton,** Department of Mathematics, University of Pittsburgh. *Turbulent, multi-physics flows on complex domains, large eddy simulation.*
2. **Yuriko Renardy,** Mathematics Department, Virginia Tech. *Mathematical theory of multi-fluid flows, droplets, and particles.*
3. **Detlef Lohse,** Chair, Physics of Fluids, Faculty of Science and Technology, University of Twente. *Flow phenomena associated with bubbles, micro- and nanofluidics, and two-phase flows.*
4. **William Ristenpart,** Department of Chemical Engineering and Materials Science, University of California at Davis. *Electrocoalescence of charged droplets, shear-induced deformation of red blood cells, electrically-induced aggregation of colloids near electrodes, and turbulent dispersion of airborne pathogens.*
5. **Christine Hrenya,** Department of Chemical and Biological Engineering, University of Colorado. *Granular flows, gas-particle fluidization, and aerosol dynamics.*
6. **Alison Marsden,** Mechanical and Aerospace Engineering, University of California, San Diego. *Cardiovascular fluid mechanics, shape optimization for complex flows, pediatric cardiology, vascular surgery.*
7. **J. Philip Drummond,** Distinguished Research Associate, NASA Langley Research Center. *Computational high-speed combustion and hypersonic propulsion.*
8. **Annie Colin,** Laboratory of the Future, Université de Bordeaux. *Jets and droplets, flow of complex fluids in confined geometries, biphasic flows in porous media, liquid-liquid wetting dynamics.*
9. **Michael Amitay,** Mechanical, Aerospace and Nuclear Engineering, Rensselaer Polytechnic Institute. *Developing flow control technologies for single and multi-phase flows for aeronautical/mechanical systems.*
10. **Urmila Ghia,** Department of Mechanical Engineering, University of Cincinnati. *Computational fluid dynamics for active and passive flow control, and turbine blade cooling.*
11. **Steve Hudson,** Physical Scientist, Materials Science & Engineering Division, Polymers & Complex Fluids Group, National Institute of Standards and Technology. *Interfacial and complex fluid rheology, microscopy, microfluidics.*
12. **Patrick Anderson,** Mechanical Engineering, Materials Technology, Eindhoven University of Technology. *Structure development during flow, interfacial phenomena, microfluidics, and polymer processing.*
13. **Michael Graham,** Chemical and Biological Engineering, University of Wisconsin–Madison. *Manipulation of genomic DNA in micro- and nanofluidic devices, flow of suspensions of cells or vesicles, the swimming of populations of microorganisms and the dynamics of complex fluids in turbulent flows.*
14. **Haim Bau,** Mechanical Engineering and Applied Mechanics, University of Pennsylvania. *Nano- and microfluidics with applications in biology and medicine.*

Other Events

Fluids Education Lunch Workshop: Simple In-Class Active Learning Activities

Monday, 25 November (Lunch), 12:45 – 13:45
Westin, Cambria Room, West
Contact: Rachel Pepper, University of California-Berkley (rachel.pepper@berkeley.edu)

This workshop will provide an opportunity for fluids educators to discuss topics of mutual interest focusing on simple in-class active learning activities such as demos, peer instruction, and tutorials. Participants will have the chance to both share their successful activities and learn from others during small group discussions at their tables. We will harvest "Best of the Table" highlights at the end of the lunch so that everyone in attendance comes away with something they can implement immediately in the classroom. To register for this event, please go to: **http://www.apsdfd2013.pitt.edu/fluids-education-lunch.**

Women in Fluids Network Lunch

Monday, 25 November, 12:45 – 14:00
Sonoma Grille [http://thesonomagrille.com/]
Located two blocks from the Convention Center

Join us in this networking lunch for female students, postdoctoral researchers, faculty and research staff. Estimated cost $20. For questions, contact: Aline Cotel (acotel@umich.edu)

Meet the APS Journal Editors

Monday, 25 November, 17:00 – 18:30
Convention Center, West Atrium (Third Floor)

The Editors of the APS journals invite you to join them for conversation and refreshments. The Editors will be available to answer questions, hear your ideas, and share concerns about the journals. All are welcome.

Geophysical Fluid Dynamics Reception

Monday, November 25, 19:00 – 20:30
Westin, Pennsylvania Ballroom (Second Floor)

Please come to an open reception for alumni and friends of the Geophysical Fluid Dynamics (GFD) Program. This program is an interdisciplinary summer program for graduate students that has been held since 1959 at the Woods Hole Oceanographic Institution. It has promoted the exchange of ideas relating to fluid mechanics among many fields, such as oceanography, meteorology, astrophysics, geology, planetary atmospheres, and applied mathematics. Over its 55-year history the GFD program has produced numerous alumni and touched many junior and senior scientists. The purpose of the reception is to bring them together along with any other interested parties. Information on how to participate in the program will be provided to those that attend the meeting.

Prizes, Awards and Fellowships

Sunday, 24 November

Welcome, Presentation of Awards and DFD Fellowships
Session B27.00001: 10:25
Convention Center, Spirit of Pittsburgh Ballroom
Chair: Jim Riley, University of Washington

Otto Laporte Lecture
Session B27.00002: 10:50
Convention Center, Spirit of Pittsburgh Ballroom
Chair: Neelesh Patankar. Northwestern University

2013 Fluid Dynamics Prize Recipient:
Elaine S. Oran, Naval Research Laboratory
The reactive flow of ideas

Elaine S. Oran of the Naval Research Laboratory, is the recipient of the 2013 Fluid Dynamics Prize that recognizes major contributions to fundamental fluid dynamics made during a career of outstanding work. The citation reads: *"For seminal contributions to the understanding of reactive flows through computational simulations, especially the deflagration-to-detonation transition in gases and supernovae."*

The Fluid Dynamics Prize was established in 1979 with support from the Office of Naval Research. In 2004, the Otto Laporte Award was combined with the Fluid Dynamics Prize so that the Division of Fluid Dynamics would have a single major prize – the Fluid Dynamics Prize. The prize is now supported by the Division of Fluid Dynamics, Friends of Otto Laporte, and the American Institute of Physics journal, *Physics of Fluids.*

In 2004, the DFD Executive Committee decided unanimously to call the lecture given by the Fluid Dynamics Prize recipient, the Otto Laporte Lecture. The rationale for this decision was to continue to honor the memory of one of the DFD's founding members, as was intended by those who originally funded the lectureship in his name. Also, this decision honors the many distinguished colleagues who were the Otto Laporte Lecturers in earlier years of the division, and the Otto Laporte Awardees after the lecture was made an APS Award in 1985.

Stanley Corrsin Lecture
Session B27.00003: 11:35
Convention Center, Spirit of Pittsburgh Ballroom
Chair: Gretar Tryggvason, University of Notre Dame

2013 Stanley Corrsin Award Recipient:
Michael Brenner, Harvard University
Fluid mechanics of fungi and slime

Michael Brenner of Harvard University is the third recipient of the Stanley Corrsin Award which "recognizes and encourages a particularly influential contribution to fundamental fluid dynamics." The citation reads: *"For his intellectual leadership in fluid dynamics and in particular for his seminal contributions to electrohydrodynamics and droplet splashing."*

The Stanley Corrsin Award is supported by an endowment fund contributed by the Division of Fluid Dynamics and held by the APS.

Prizes, Awards and Fellowships

APS LeRoy Apker Award
Session E3.00005: 17:37
Convention Center, Room 325
Chair: Deniz Tolga Akcabay, University of Michigan

2013 APS LeRoy Apker Award Recipient:
Guy Geyer Marcus, Wesleyan University
Using 3D printing and stereoscopic imaging to measure the alignment and rotation of anisotropic particles in turbulence

Guy Geyer Marcus of Wesleyan University is the recipient of the APS LeRoy Apker Award which "recognizes outstanding achievements in physics by undergraduate students, and thereby provides encouragement to young physicists who have demonstrated great potential for future scientific accomplishment."
Thesis Title: "Rotational dynamics of anisotropic particles in turbulence: Measurements of Lagrangian vorticity and the effects of alignment with the velocity gradient."
Advisor: Greg Voth

(Note: There is a second 2013 Apker recipient, Hao Shi of the Rochester Institute of Technology, who will receive his award at the DAMOP meeting next Spring.)

Tuesday, 26 November

Andreas Acrivos Dissertation Award Lecture
Session P27: 11:10
Convention Center, Spirit of Pittsburgh Ballroom A
Chair: Jonathan Rothstein, University of Massachusetts at Amherst

2013 Andreas Acrivos Dissertation Award Recipient:
Bishakhdatta Gayen, University of California, San Diego
Turbulence and internal waves in tidal flow over topography

François N. Frenkiel Award Lecture
Session P28: 11:10
Westin, Spirit of Pittsburgh Ballroom B/C
Chair: Malcolm J. Andrews, Los Alamos National Laboratory

2013 François Frenkiel Award Recipient:
Diego Donzis, Texas A&M University
Shock structure in shock-turbulence interactions. Physics of Fluids volume 24, paper number 126101 (2012).

Prizes, Awards and Fellowships

2013 Fellows

Kenneth Christensen: University of Illinois, Urbana-Champaign
For his fundamental and innovative contributions to the understanding of wall turbulence, including the character of span-wise vortices and the effects of surface roughness, the behavior of microfluidic systems, and the development of new PIV instruments.

Noel Clemens: University of Texas, Austin
For the development and application of innovative experimental methods leading to fundamental understanding of shear flow mixing, turbulent flame structure and supersonic unsteady flows.

Jimmy Feng: University of British Columbia, Vancouver, Canada
For pioneering studies of solid-liquid two-phase flows, interfacial dynamics of complex fluids, and phase-field modeling of the moving contact line.

John Foss: Michigan State University
For fundamental experimentation of complex flows, novel surface topology analyses and for groundbreaking vorticity measurements.

Rama Govindarajan: Tata Institute of Fundamental Research, Hyderabad, India
For contributions to our understanding of laminar-turbulent transition, especially in viscosity-stratified flows.

Thomas Jackson: University of Illinois, Urbana-Champaign
For pioneering research in reacting flows, especially stability analysis of compressible shear flows, and modeling and simulation of complex heterogeneous solid propellant combustion.

Yogesh Jaluria: Rutgers University
For pioneering and lasting contributions to a wide variety of fundamental and applied areas in fluid mechanics, particularly to buoyancy-induced flows, computational fluid dynamics, microscale transport, fluid flow phenomena in materials processing, the spread and growth of fires in enclosed spaces, and environmental flows.

Arne Johansson: Royal Institute of Technology, Stockholm, Sweden
For pioneering and lasting contributions, using theory, numerical simulation and experiment, to our understanding of turbulent flows and turbulence modeling.

Patrice Le Gal: Institut de Recherche sur les Phénomènes Hors Equilibre (IRPHE), Marseilles, France
For original experimental research in geophysical fluid dynamics, notably the strato-rotational and elliptic instabilities, and for experimental research in pattern formation in Rayleigh-Bénard convection, in wakes, and in fluids between rotating disks.

Jeffrey Morris: City College of the City University of New York
For outstanding research in the flow of multi-phase mixtures, including the development of nonequilibrium microstructure in Stokes flow, constitutive modeling and bulk flow analysis, measurement of the particle pressure, and elucidating the influence of particle-scale inertia on rheology and flow.

Ranga Narayanan: University of Florida, Gainesville
For seminal contributions in research and education in the field of interfacial instabilities and for work in generating novel and revealing experiments on pattern formation.

Thomas Powers: Brown University
For pioneering, rigorous and creative contributions to our understanding of the dynamics of membranes and filaments in viscous flows, particularly regarding the theory of bacterial motility in viscous and viscoelastic media and the role of hydrodynamic interactions at low Reynolds number.

Alfredo Soldati: University of Udine, Italy
For his contribution to our understanding of the role of turbulence in multiphase flow processes and for nurturing and promoting the teaching and study of multiphase flow phenomena.

Prizes, Awards and Fellowships

Hyung Jin Sung: Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea
For contributions to turbulence, fluid-structure interaction and opto/micro fluidics to find the fundamental physics of these flows and their applications using various numerical and experimental techniques.

Roberto Verzicco: University of Roma, Roma, Italy
For his seminal contribution to the development of algorithms for direct numerical simulations of thermally driven turbulence, vortex flows, and complex flows, for the resulting deep physical understanding of these flows, and for his collaborative attitude which has strongly served the fluid dynamics community.

Jorge Vinals: University of Minnesota
For his contributions to pattern formation in non-equilibrium systems, especially quasi crystalline patterns in Faraday waves, domain coarsening in modulated phases, and the general study of coarse grained fluids described by an order parameter.

Jose Weisfreid: Ecole Supérieure de Physique et de Chimie (ESPCI), Paris, France
For pioneering experiments in pattern formation as well as transition and flow control, and for scientific leadership in France and building partnerships with Latin America.

Steven Wereley: Purdue University
For pioneering contributions to the development of microPIV and microfluidics, authoring broadly-used monographs on PIV and microfluidics, and meritoriously representing the fluid dynamics community in the Deepwater Horizon Oil Spill.

Invited Lectures

The 2013 annual meeting will feature the following eight invited lectures, each pair presented in two parallel sessions. Each invited lecture will be thirty minutes long, followed by five minutes for questions.

Sunday, 24 November

Invited Session C27
13:35, Convention Center, Spirit of Pittsburgh Ballroom A
Chair: James M. Wallace, University of Maryland

Karen Flack, United States Naval Academy
Roughness effects on wall-bounded turbulent flows

Invited Session C28
13:35, Convention Center, Spirit of Pittsburgh Ballroom B/C
Chair: Howard A. Stone, Princeton University

Anke Lindner, PMMH-ESPCI
Microfluidic flows of complex suspensions: From flexible polymers to swimming bacteria

Monday, 25 November

Invited Session J27
14:00, Convention Center, Spirit of Pittsburgh Ballroom A
Chair: Morteza Gharib, California Institute of Technology

John Dabiri, California Institute of Technology
Do swimming animals mix the ocean?

Invited Session J28
14:00, Convention Center, Spirit of Pittsburgh Ballroom B/C
Chair: Forman A. Williams, University of California, San Diego

William Sirignano, University of California, Irvine
Dynamics of transient liquid injection

Invited Session K27
14:40, Convention Center, Spirit of Pittsburgh Ballroom A
Chair: George Homsy, University of California, Santa Barbara

John Lister, University of Cambridge
Porous-medium convection: New problems from CO_2 sequestration

Invited Session K28
14:40, Convention Center, Spirit of Pittsburgh Ballroom B/C
Chair: Gareth H. McKinley, Massachusetts Institute of Technology

Michael Graham, University of Wisconsin-Madison
Drag reduction and the dynamics of turbulence in simple and complex fluids

Tuesday, 26 November

Invited Session N27
10:30, Convention Center, Spirit of Pittsburgh Ballroom A
Chair: J. Philip Drummond

Ann Karagozian, University of California, Los Angeles
Transverse jet shear layer instabilities and their control

Invited Session N28
10:30, Convention Center, Spirit of Pittsburgh Ballroom B/C
Chair: Harry L. Swinney, University of Texas at Austin

Daniel Goldman, Georgia Tech
Swimming and running through sand: Resistive force theory in granular media

Minisymposia

The 2013 annual meeting will feature the following minisymposia, each one consisting of talks that are twice as long as regular contributed talks.

Sunday, 24 November

Minisymposium: Session D4
14:15 – 16:25
Convention Center, Room 326

Nanobubbles
Chair: Detlef Lohse, University of Twente

Monday, 25 November

Minisymposium: Session H20
10:30 – 12:40
Convention Center, Room 315

Global climate models: Dynamical cores, strengths and weaknesses
Co-Chairs: Jim Brasseur, Pennsylvania State University; Brad Marston, Brown University; John Wettlaufer, Yale University

Minisymposium: Session H23
10:30 – 12:40
Convention Center, Room 318

Frontiers in combustion physics I
Chair: Forman A. Williams, University of California at San Diego

Tuesday, 26 November

Minisymposium: Session R22
13:05 – 15:15
Convention Center, Room 317

Frontiers in combustion physics II
Chair: Javier Urzay, Stanford University

Focus Sessions

This year's program includes four Focus Sessions organized around a specific theme. Unlike Minisymposia, they consist of presentations of normal length, only some of which are solicited by the organizers.

Sunday, 24 November

Focus Session: Session A13
08:00 – 09:57
Convention Center, Room 301

Marine hydrokinetic energy conversion I
Chair: Laura Beninati, Bucknell University

Focus Session: Session D13
14:15 – 16:12
Convention Center, Room 301

Marine hydrokinetic energy conversion II
Chair: Martin Wosnick, University of New Hampshire

Focus Session: Session E13
16:45 – 17:50
Convention Center, Room 301

Marine hydrokinetic energy conversion III
Chair: Luksa Luznik, United States Naval Academy

Tuesday, 26 November

Focus Session: Session R31
13:05 – 15:41
Convention Center, Room 402

Structure of turbulent-nonturbulent interfaces
Chair: Carlos B. da Silva, Technical University of Lisbon

Instructions to Speakers, Session Chairs and All Poster Presenters

1. Speakers should arrive at least 10 minutes prior to the start of the session and introduce themselves to the Session Chair.

2. A cable TV monitor in each room will be used to time the sessions. This timing will be strictly enforced by the Session Chair.

3. Contributed papers are limited to 10 minutes with 2 additional minutes for discussion. This is followed by 1 minute for transition to the next paper and introduction of the next speaker. During the talk, the monitor will indicate at 8 minutes that the speaker has to finish in 2 minutes. At 10 minutes, it will indicate that the speaker's presentation time is over. At 12 minutes, it will indicate that transition to the next speaker **must occur.**

4. A minisymposium paper is 26 minutes long, including questions and transition. This makes a minisymposium paper twice as long as a regular contributed paper, allowing attendees to move between regular talks and minisymposia. Minisymposium talks will be 20 – 22 minutes long with 5 – 3 minutes for discussion and 1 minute for transition. However, note that the time monitor in the room will keep the regular 13 minute schedule.

5. The Otto Laporte and Stanley Corrsin Lectures are 40 minutes with 5 additional minutes for discussion (total 45 minutes). Invited lectures are 30 minutes long with an additional 5 minutes for discussion (total 35 minutes). The Andreas Acrivos Dissertation Award Lecture and François Frenkiel Award Lectures are 17 minutes with 3 additional minutes for discussion (total 20 minutes).

6. Each presentation room is equipped with an LCD projector, screen, lavalier microphone and pointer. Speakers must provide their own laptop computer. Macintosh users should provide their own adaptor to connect their laptop to the projector. Speakers are responsible for procurement and cost of renting any additional AV equipment. Also note that the APS is not responsible for the security of any personal computers.

7. **There is very little time to recover from an AV malfunction, should one occur. Please check for the following common reasons for malfunctions before your presentation:**

   - **Meeting room projectors will have 1024 by 768 resolution. Please set your laptop resolutions to 1024 by 768 or lower. Your images will not display properly if your laptop resolution is higher than the projector's.**
   - **Set the power profile, monitor profile and screensaver on your laptop to turn off the sleep/hibernate mode. Your laptop will usually revert to its default resolution if it goes into sleep/hibernate mode.**
   - **Animations and equations in PowerPoint are not necessarily compatible across different versions. If you load your presentation on to a different computer, please check that it displays correctly.**
   - **Show up ten minutes before the session starts, and ask the student volunteer in the room to connect your laptop to the six-way switch; do not do so by yourself.**
   - **Macintosh users should bring their own adaptor to connect their laptop to the projector.**
   - **A Speaker Ready Room staffed by technicians is provided for your use. Please test your presentations and confirm your laptop settings in the Speaker Ready Room prior to your talk.**

Please Note: Speaker Ready Room is located in the Convention Center – Room 309.

Instructions to Speakers, Session Chairs and All Poster Presenters

Additional Notes to Session Chairs:

1. Please be on time. Arrive in the presentation room at least 10 minutes prior to the session start time. Just before the session begins, briefly introduce yourself and explain the timing system to the audience.
2. Start the session on time. Announce the first abstract and author when the monitor timing system signals the beginning of the talk.
3. Strictly adhere to the timing signals. The purpose of these timing signals is to allow attendees to move from one session to another and to be able to rely on the exact time of each presentation as listed in the program. Speakers must be asked to stop when their allotted time is up.
4. Please check the Corrigenda and program agenda for your session. If a presentation has been withdrawn or should a speaker fail to appear, allow the preceding discussion to continue, or suspend the session until it is time for the next scheduled abstract. You may allow a speaker who misses his scheduled time to speak at the end of the session if time allows.
5. All meeting rooms will have a student volunteer to assist you with running the session.

Instructions for All Poster Session Set ups

Gallery of Fluid Motion Posters, Student Poster Session 1A and Poster Sessions 1B

Set-up: **Please note there are different set up locations depending on your poster category.**

Poster Session 1A: Student Poster Session: Set up in the South Terrace Foyer
Poster Session 1B: Poster Session: Set up outside the Spirit of Pittsburgh Ballroom
Gallery of Fluid Motion Posters: Set up in Exhibit Hall A

Please place your poster in the correct poster session location as indicated above.

Boards will be in place and numbered by 13:00 on Saturday. Entries may be put up between 13:00 and 20:00 on Saturday evening, 23 November, or between 07:00 and 09:00 on Sunday, 24 November.

- Entries are to be mounted in the numbered space that has been reserved for it.
- Refer to the poster listing for poster number and correct poster display location.
- Velcro and pushpins will be provided. Presenters must bring any other supplies needed to mount their posters.
- Poster boards (a little less than one-half of an 8-foot long x 4-foot high poster board for each entry i.e., 45″ x 45″) will be available for mounting.

Presentation: Poster authors must be by their board for the sessions 1A and 1B on Sunday, 24 November from 18:15 – 19:00.

Dismantling: Presenters must dismantle their posters by noon on Tuesday, 26 November. After that they will be discarded.

Gallery of Fluid Motion

Gallery of Fluid Motion Hours

Convention Center, Exhibit Hall A; open daily during Exhibit Hours

Organized by: Sung K. Cho and Paolo Zunino, University of Pittsburgh

The 31st Annual Gallery of Fluid Motion consists of computational and experimental still images (posters) and videos submitted by attendees. A panel selects outstanding entries based on artistic value, scientific content, and originality. The winning entries will be displayed at the Annual APS Meeting in March 2014 and will appear in *Physics of Fluids,* September 2014.

The award-winning entries will be announced at 15:25 on Monday, 25 November 2013, immediately after the invited lectures in Exhibit Hall A.

Posters

P001. Direct numerical simulations of transition due to stationary crossflow instability in a swept-wing boundary layer
Lian Duan, Missouri University of Science and Technology; Meelan M. Choudhari, Fei Li, NASA Langley Research Center

P002. Washing wedges
Etienne Reyssat, ESPCI, Paris

P003. Bubble shapes in confined spaces
Abel Lopez-Villa, Ubaldo Romero, Abraham Medina, ESIME Azcapotzalco, Instituto Politécnico Nacional, Mexico

P004. Polygonal bubble clouds
Pedro A. Quinto-Su, Instituto de Ciencias Nucleares, Universidad Nacional Autóma de México

P005. Dynamics of inertial particles
Steven Wang, Guy Metcalfe, Robert Stewart, Jie Wu, CSIRO, Australia

P006. Symmetric vortex shedding in the wake of a circular cylinder placed inside a pipe
A. Venugopal, Lavish Ordia, Amit Agrawal, S. V. Prabhu, Indian Institute of Technology Bombay, India

P007. Atomization in sparkling fireworks
Chihiro Inoue, University of Tokyo; Joji Kuwabara, Keiji Jo, Photron

P008. Visualization of steam injection in a pipe filled with a granular medium
Fernando Aragon Rivera, ESIME Zacatenco IPN; Ayax Torres, ESIME Azcapotzalco IPN; Salomón Peralta, Abraham Medina Ovando, Instituto Mexicano del Petróleo; Gerardo Ruiz, Facultad de ciencias de la UNAM

P009. Boundary layer bypass transition
Xiaohua Wu, Royal Military College of Canada; Parviz Moin, CTR, Stanford University

P010. Explosive fragmentation
Alexandre Vledouts, Aix-Marseille Université; Jose Graña-Otero, Universidad Politcnica de Madrid; Joel Quinard, Nicolas Vandenberghe, Emmanuel Villermaux, Aix-Marseille Université

P011. Rolling up shear layer
Christoph Strangfeld, Karsten Düwel, Christian Navid Nayeri, Christian Oliver Paschereit, Hermann-Föttinger-Institut, TU-Berlin

P012. 3D printing of vortical structures
Daniel Canuto, Ryan Jantzen, Kunihiko Taira, Florida State University

P013. Impinging jet on an inclined superhydrophobic surface
Alexis Duchesne Rémy Herbault, Laurent Limat, Université Paris Diderot

Gallery of Fluid Motion

P014. Bypass transition in Osborne Reynolds pipe flow: Simultaneous reversed and normal hairpin packets
Xiaohua Wu, Royal Military College of Canada; Parviz Moin, CTR, Stanford University; Ronald J. Adrian, Jon Baltzer, Arizona State University; Jean-Pierre Hickey, CTR, Stanford University

P015. Explosive boiling of droplets impacting carbon-nanofiber surfaces
Hendrik J. J. Staat, University of Twente; Tuan Tran, Nanyang Technological University; Hrudya Nair, Arie van Houselt, University of Twente; Andrea Prosperetti, Johns Hopkins University; Chao Sun, Detlef Lohse, University of Twente

P016. The evolution of a plughole vortex and the onset of rotating solitary wave at the wall of a circular cylinder
Mohamed Fayed, Alexandria University; Hamid Ait Abderrahmane, King Abdullah University of Science and Technology; Hoi Dick Ng, Concordia University

P017. The Morning Glory cloud: Flow visualization by nature
Zaim Ouazzani, MIT; Jorg Hacker, Flinders University; Rob Thompson, Baddog Productions; Thomas Peacock, MIT

P018. Successive droplet encapsulations revealed by optofluidics
M. Lismont, D. Robert, N. Vandewalle, L. Dreesen, University of Liége

P019. Microscale vortex control with artificial cilia
Ya-Ting Hu, Cheng-Yi Lin, Chia-Yuan Chen, National Taiwan University of Science and Technology

P020. Bubbles in complex microgeometries at large capillary numbers
Martin Sauzade, Thomas Cubaud, Stony Brook University

P021. Formation and evolution of cylindrically diverging detonation waves in gases
Duowen Qian, John H. S. Lee, McGill University, Montreal, Canada; Hoi Dick Ng, Concordia University, Montreal, Canada

P022. Rayleigh-Taylor instability in artistic creation
Elsa de la Calleja, Sandra Zetina, Roberto Zenit, UNAM, Mexico

P023. Bubbles forming through a granular layer
Dante Hernandez, Ernesto Mancilla, Roberto Zenit, UNAM, Mexico

P024. Jelly Christmas: Induced drift in juvenile jellyfish
Janna Nawroth, John Dabiri, Caltech

P025. Increased transport inside an oscillating droplet in a microchannel
Adam DeVoria, Kamran Mohseni, University of Florida

P026. A spiral galaxy in kitchen sink?
Hamid Ait Abderrahmane, Aslan Kasimov, King Abdullah University of Science and Technology (KAUST)

P027. Coalescence of soap bubbles: Petals and fractals
Beng Hau Tan, Silvestre Roberto Gonzalez Avila, Claus-Dieter Ohl, Nanyang Technological University

P028. Vortex shedding in laminar separation bubbles
Thomas Kirk, University of Waterloo; Bülent Yaniktepe, Osmaniye Korkut Ata University; Andrew Lambert, Serhiy Yarusevych, University of Waterloo

P029. Encapsulation of water droplets on fibers
F. Weyer, L. Dreesen, N. Vandewalle, GRASP, University of Liége

P030. Droplet formation between a stationary bubble and a porous membrane
Mahshid Mohammadi, Dustin Ward, Kendra Sharp, Oregon State University

P031. Wind in soap bubbles
John Davidson, Lori Lambert, Erica Sherman, Timothy Wei, Sangjin Ryu, University of Nebraska-Lincoln

P032. Volumetric flow field of the wake of a finite cylinder
Francois Nicolas, Louis Cattafesta, Eric Deem, Florida State University

Gallery of Fluid Motion

P033. Revisiting Da Vinci's turbulence studies
Bryan E. Kaiser, University of New Mexico

P034. Archer fish fluid mechanics: Liquid jet piercing through an interface
Sunghwan Jung, ESM, Virginia Tech; Benoit Roman, Jose Bico, PMMH, ESPCI-ParisTech

P035. Drop impact on shallow fluid of heavier density
Chua Xinyi Simon, Claus Dieter-Ohl, Nanyang Technological University, Singapore

P036. Thermocromic liquid crystal droplets in evaporating drops
Rodrigo Segura, Alvaro G. Marin, Christian J. Kaehler, University Bundeswehr Munich

P037. Free shearless multi-material turbulent mixing in the presence and absence of gravity
Pooya Movahed, Eric Johnsen, University of Michigan, Ann Arbor

P038. 3D visualization of wake vortices
Chris Morton, Serhiy Yarusevych, University of Waterloo

P039. Instability of immiscible jets in oil
Abhishek Bajpayee, Leah Mendelson, Barry E. Scharfman, Juliana Wu, Alexandra H. Techet, MIT

P040. Bathtub vortex waves
Katrine Haaning, Anders Andersen, Technical University of Denmark

P041. Visualizing bubble dynamics in a simulated hydraulic jump
Adam Witt, John Gulliver, Lian Shen, St. Anthony Falls Laboratory

P042. A convention of UFOs
Adam T. Paxson, Rajeev Dhiman, J. David Smith, Kripa K. Varanasi, Sushant Anand, MIT

P043. Particle distribution and its effect on modeling with detonation shock dynamics
John Bdzil, Scott Stewart, Brandon Lieberthal, University of Illinois at Urbana-Champaign

P044. Half a splash is better than one
Michelle M. Driscoll, Sidney R. Nagel, Andrzej Latka, University of Chicago

P045. Viscous fingering instability for miscible fluids in a porous medium
Irmgard Bischofberger, Radha Ramachandran, Sidney R. Nagel, University of Chicago

P046. Airflows induced by a bouncing sphere
Irmgard Bischofberger, Michelle M. Driscoll, Sidney R. Nagel, University of Chicago

P047. Liquid ember
Konrad Rykaczewski, Arizona State University; Adam Paxson, Srinivas P. B. Subramanyam, MIT; Daniel Beysens, ESPCI-CEA-CNRS; Kripa K. Varanasi, Sushant Anand, MIT

P048. Confessions of a sitzpinkler
R. C. Hurd, C. S. Mabey, K. S. Hacking, K. G. Bodily, T. T. Truscott, Brigham Young University

P049. Cavity formation of highly deformable spheres
R. C. Hurd, K. G. Bodily, C. S. Mabey, T. T. Truscott, Brigham Young University; J. Belden, Naval Undersea Warfare Center

P050. The wake of a buoyant sphere
Chris Mabey, Zach Smith, Wesley Fassmann, Tadd Truscott, Brigham Young University

P051. Ferrofluid-droplet interactions
Karim Khalil, Seyed Mahmoudi, Kripa Varanasi, MIT

P052. Shock reflections in reactive gases
Logan Maley, Matei Radulescu, University of Ottawa

P053. Shedding a tangle
Martin Scheeler, Dustin Kleckner, William T. M. Irvine, University of Chicago

P054. Viscous fingering
Pietro de Anna, Ruben Juanes, Jane Chui, MIT

P055. Cascading jets on elastic beams
Sean Gart, Sunghwan Jung, Virginia Tech

Gallery of Fluid Motion

P056. Three-dimensional structure of a shock-driven gas column
T. Bernard, G. Kuehner, D. Olmstead, C. R. Trumen, P. Vorobieff, P. Wayne, University of New Mexico

P057. Mathematical modeling of magnetic particles in blood flow applied to magnetic drug targeting
Timothy Barnes, Shahriar Afkhami, New Jersey Institute of Technology

P058. Electrostatic charging of coalescence-induced jumping water droplets
Nenad Miljkovic, Daniel John Preston, MIT; Ryan Enright, Alcatel-Lucent Ireland Ltd., Bell Labs Ireland; Evelyn N. Wang, MIT

P059. Vapor flow entrainment of jumping water droplets
Daniel John Preston, Nenad Miljkovic, MIT; Ryan Enright, Alcatel-Lucent Ireland Ltd., Bell Labs Ireland; Evelyn N. Wang, MIT

P060. Unsetting events in the settling of soft granular matter
Qiwei C. Xue, Thibault Bertrand, Eric R. Dufresne, Yale University; Christopher W. MacMinn and John S. Wettlaufer, Yale University and University of Oxford

Videos

V001. Gravitational drainage of thin films of trisiloxane-(poly)ethoxylate superspreaders
Soumyadip Sett, Rakesh Prasad P. Sahu, Suman Sinha-Ray, Alexander Yarin, University of Illinois at Chicago

V002. Supersonic jet excitation using flapping injection
Haukur Elvar Hafsteinsson, Lars-Erik Eriksson, Niklas Andersson, Chalmers University of Technology; Daniel Cuppoletti, Ephraim Gutmark, University of Cincinnati; Erik Prisell, FMW, Sweden

V003. Electrohydrodynamically induced mixing in immiscible multilayer flows
Radu Cimpeanu, Demetrios Papageorgiou, Imperial College London

V004. Degenerate Rayleigh-Plateau instability in a magnetically annealed colloidal dispersion
James W. Swan, Yifei Liu, Eric M. Furst, University of Delaware

V005. Scalar transfer across a turbulent/non-turbulent interface in a planar jet
Tomoaki Watanabe, Yasuhiko Sakai, Kouji Nagata, Osamu Terashima, Yasumasa Ito, Nagoya University; Toshiyuki Hayase, Tohoku University

V006. Scrambled and unscrambled turbulence
Praveen Ramaprabhu, Varad Karkhanis, University of North Carolina at Charlotte; Andrew Lawrie, University of Bristol, United Kingdom

V007. Liquid droplet impact dynamics on micro-patterned superhydrophobic surfaces
Cristian Clavijo, Daniel Maynes, Julie Crockett, Brigham Young University

V008. The sedimentation of flexible filaments: Trajectories, particle clouds and a buckling instability
Harishankar Manikantan, University of Illinois at Urbana-Champaign; Lei Li, University of Wisconsin-Madison; David Saintillan, University of Illinois at Urbana-Champaign; Saverio Spagnolie, University of Wisconsin-Madison

V009. Electrokinetically driven reversible banding of colloidal particles near the wall
Necmettin Cevheri, Minami Yoda, Georgia Institute of Technology

V010. Sessile droplet evaporation on superheated superhydrophobic surfaces
Robb C. Hays, Julie Crockett, Daniel Maynes, Brent W. Webb, Brigham Young University

V011. Electro-osmotic instability and chaos near ion-selective surfaces
Mathias B Andersen, Clara L. Druzgalski, Scott M. Davidson, Ali Mani, Stanford University

Gallery of Fluid Motion

V012. Broad leaves in strong flow
Laura A. Miller, University of North Carolina; Arvind Santhanakrishnan, Oklahoma State University

V013. Spontaneous ordering of a bacterial drop into a spiral vortex
Hugo Wioland, DAMTP, University of Cambridge (UK); Enkeleida Lushi, Brown University; Raymond E. Goldstein, DAMTP, University of Cambridge (UK)

V014. Inertial rise in short capillaries
Orest Shardt, Prashant R. Waghmare, J. J. Derksen, Sushanta K. Mitra, University of Alberta

V015. Physics of urine, from mice to elephants
Patricia Yang, Jonathan Pham, Jerome Choo, David L. Hu, Georgia Inst. Tech

V016. Instabilities by ionic bombardment
Seyed Reza Mahmoudi, Sushant Anand, MIT; K. Adamiak, G.S.P. Castle, University of Western Ontario, London; Kripa K. Varanasi, MIT

V017. Dropping the ball: The effect of anisotropic granular material on ejecta and impact crater shape
Philip Drexler, Haverford College; Nathan Keim, Paulo Arratia, University of Pennsylvania

V018. Elucidating the turbulence nature of the intracardiac flow: from medical images to multi-cycle Large Eddy Simulations
Christophe Chnafa, Simon Mendez, Franck Nicoud, University Montpellier II, France

V019. The shock and the turbulence: The story of an interaction
Iván Bermejo-Moreno, Stanford University; Johan Larsson, University of Maryland, College Park; Sanjiva Lele, Stanford University

V020. Clustering of inertial cloud droplets in isotropic turbulence
Peter J. Ireland, Cornell University; John Clyne, Perry Domingo, Tim Scheitlin, U.S. National Center for Atmospheric Research;, Lance R. Collins, Cornell University

V021. Fluid juggling
Enrique Soto, Roberto Zenit, Universidad Nacional Autónoma de México

V022. The way to reduce electrical charge of a droplet dispensed from a pipette tip
Dongwhi Choi, Horim Lee, Do Jin Im, Dong Sung Kim, POSTECH, Korea

V023. Magnetocapillary swimmers
Maxime Hubert, Galien Grosjean, Yves-Eric Corbisier, Geoffroy Lumay, Floriane Weber, Noriko Obara, Nicolas Vandewalle, University of Liége

V024. Bursting of rigid bubbles
Pauline Petit, Anne-Laure Biance, Universite Lyon 1, France

V025. Excited sessile drops dance harmonically
Chun-Ti Chang, Susan Daniel, Paul H. Steen, Cornell University

V026. Dynamics of the Faraday instability in a small cylinder
William Batson, University of Florida / Université Lille 1; Farzam Zoueshtiagh, Université Lille 1; Ranga Narayanan, University of Florida

V027. Synchronous droplet microfluidics: One "Clock" to rule them all
Georgios Katsikis, Manu Prakash, Stanford University

V028. Why does a beer bottle foam up after a sudden impact on its mouth?
Javier Rodríguez-Rodríguez, Almudena Casado-Chacón, Carlos III University of Madrid; Daniel Fuster, Universite Pierre et Marie Curie, France

V029. Compressible flows in fluidic oscillators
Damian Hirsch, Emilio Graff, Mory Gharib, Caltech

V030. The Hama problem revisited: Essential mixing in a free shear flow
V. A. Miller, Stanford University; M. G. Mungal, Santa Clara University / Stanford University

V031. Squeezing through: Capsule or bubble?
Geoffrey Dawson, Anne Juel, University of Manchester

V032. Elastic swimmer on a free surface
Sophie Ramananarivo, Benjamin Thiria, Ramiro Godoy-Diana, ESPCI ParisTech / U. Paris Diderot, France

Gallery of Fluid Motion

V033. Bubble visualization in a simulated hydraulic jump
Adam M. Witt, John S. Gulliver, Lian Shen, University of Minnesota

V034. Wake turbulence of two NREL 5-MW wind turbines immersed in a neutral atmospheric boundary-layer flow
Jessica Bashioum, Pankaj Jha, Sven Schmitz Penn State University; Earl Duque, Applied Research Group - Intelligent Light

V035. Wrinkly fingers: The interaction between fluid- and solid-based instabilities in elastic-walled Hele-Shaw cells
Draga Pihler-Puzovic, Anne Juel, Matthias Heil, University of Manchester

V036. Ignition sequence of an annular multi-injector combustor
Maxime Philip, Matthieu Boileau, Ronan Vicquelin, Thomas Schmitt, Daniel Durox, Jean-François Bourgoin, Sébastien Candel, Ecole Centrale Paris, France

V037. When viscous jets collide; liquid chains, threads, webs, fishbones and balloons
Bavand Keshavarz, Gareth H. McKinley, MIT

V038. Fast and scalded: Capillary Leidenfrost droplets in micro-ratches
Alvaro G. Marin, University Bundeswehr Munich; Daniel Arnaldo del Cerro, Gert-Willem Römer, Detlef Lohse, Univ. Twente

V039. Underwater gas expansion and deflagration
Van Jones, Kariann Vander Pol, John Gilbert, Leigh McCue-Weil, Virginia Tech

V040. Liquid-solid impact of yield stress fluids
Marc E. Deetjen, Brendan C. Blackwell, Joseph E. Gaudio, Randy H. Ewoldt, University of Illinois at Urbana-Champaign

V041. What am I? Supercooled droplet or ice?
Carlo Antonini, Adrian Mularczyk, Tanmoy Maitra, Dimos Poulikakos, ETH Zurich-LTNT, Switzerland

V042. Influence of a local change of depth on the behavior of bouncing oil drops
Remi Carmigniani, Simon Lapointe, Sean Symon, Beverley J. McKeon, California Institute of Technology

V043. Flows in inkjet-printed aqueous rivulets
Vadim Bromberg, Timothy J. Singler, SUNY Binghamton

V044. Impinging jet resonant modes at Mach 1.5
Timothy B. Davis, Farrukh S. Alvi, Florida State University

V045. Dancing droplets
Nate J. Cira, Manu Prakash, Stanford University

V046. Shape oscillation of a levitated drop in an acoustic field
Weiyu Ran, Steven Fredericks, Clemson University

V047. Fluid mechanics of everyday objects
Nick J. Parziale, Joseph S. Jewell, Bryan E. Schmidt, Jason Rabinovitch, Reeve Dunne, California Institute of Technology

V048. Flow control with dynamic roughness
Vinay Jakkali, Wade W. Huebsch, Patrick H. Browning, Shanti D. Hamburg, West Virginia University

V049. Deconstructing wall turbulence - visualization of resolvent modes
Daniel Barella, Oberlin College; Sarah Churng, University of Washington; Conrad Egan, Texas A&M University; Rashad Moarref, Mitul Luhar, Hillary Mushkin, California Institute of Technology; Scott Davidoff, NASA Jet Propulsion Laboratory; Maggie Hendrie, Art Center College of Art and Design; Beverley J. McKeon, California Institute of Technology

V050. Self-assembling paramagnetic colloids in oscillating magnetic fields
Alison E. Koser, Nathan C. Keim, Paulo E. Arratia, University of Pennsylvania

V051. Flying with abrupt wing flapping: Damselfly in darting flight
Chengyu Li, Haibo Dong, Wen Zhang, University of Virginia

V052. Self healing soap films
Taylor Killian, Jordan Huey, Joshua Bryson, Tadd Truscott, Brigham Young University

Gallery of Fluid Motion

V053. Catastrophic cracking courtesy of quiescent cavitation
D. Jesse Daily, Ken Langley, Scott L. Thomson, Tadd T. Truscott, Brigham Young University

V054. Hydrodynamic causes and effects of air bubbles rising in very viscous media
Sharad Chand Ravinuthala, Ismail Celik, West Virginia University

V055. Sticking around: An up-close look at drop adhesion
Adam Paxson, Kripa K. Varanasi, MIT

V056. Turbulence-flame Interaction
Brock Bobbitt, Bruno Savard, Guillaume Blanquart, California Institute of Technology

V057. Fluid fragmentation from hospital toilets
G. Traverso, MGH/Harvard Medical School/ Kock Institue; S. Laken, Pavoda, Inc; C.-C. Lu, ENSTA ParisTech; R. Maa, MIT; R. Langer, Koch Institute/MIT; L. Bourouiba, MIT

V058. The life of a vortex knot
Dustin Kleckner, Martin Scheeler, William T. M. Irvine, University of Chicago

V059. Airflow in a multiscale subject-specific breathing human lung model
Jiwoong Choi, Youbing Yin, Eric A. Hoffman, University of Iowa; Merryn H. Tawhai, University of Auckland; Ching-Long Lin, University of Iowa

V060. Knotted vortices: Entropic Lattice
Boltzmann method for vortex dynamics S.S.Chikatamarla, ETH Zurich; J. Favre, CSCS Switzerland; F. Boesch, I.V. Karlin, ETH Zurich

V061. Droplets on a tilted plate
Michiel Musterd, Volkert van Steijn, Chris R. Kleijn, Michiel T. Kreutzer, Delft University of Technology

V062. Dynamics of coalescence-induced jumping water droplets
Nenad Miljkovic, Daniel John Preston, MIT; Ryan Enright, Alcatel-Lucent Ireland Ltd., Bell Labs Ireland, Ireland; Evelyn N. Wang, MIT

V063. High-frequency capillary waves excited by oscillating microbubbles
Angelo Pommella, Jeanne Lantz, Vincent Poulichet, Valeria Garbin, Imperial College London

V064. The beauty of fluidization
Franklin Shaffer, Balaji Gopalan, US DOE National Energy Technology Laboratory

V065. Complex structure of dynamic stall on wind turbine airfoils
Michael Hind, John Strike, Pourya Nikoueeyan, Andrew Magstadt, Ashli Babbitt, Phillip Davidson, Jonathan Naughton, University of Wyoming

V066. Homage to Bob Brodley at 85: Ejections, sweeps and Reynolds shear stress generation in turbulent pipe flow
James M. Wallace, James H. Duncan, University of Maryland

V067. Acoustophoretic Waltz: A contactless exothermal reaction
Daniele Foresti, Dimos Poulikakos, ETH Zurich, Switzerland

V068. Hydrodynamics in the wake of a pitching foil
R. Fernandez-Pratz, F.J. Huera-Huarte, Universitat Rovira i Virgili, Spain

Exhibits

Exhibit Hours

Sunday, 24 November	**07:00 – 17:00 AND 19:00 – 21:30**
Monday, 25 November	**07:30 – 17:00**
Tuesday, 26 November	**07:30 – 11:00**

Convention Center, Exhibit Hall A

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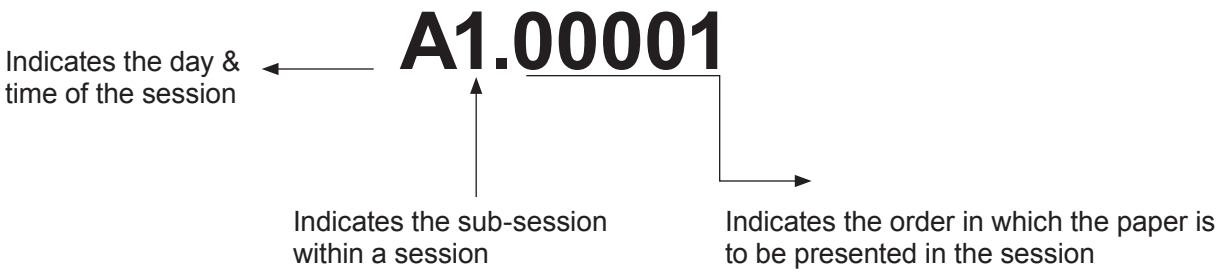
The contributed papers have been assigned a unique alpha-numeric code. For example:



Ax	Sunday	08:00 – 09:57
Bx	Sunday	10:25 – 12:20
Cx	Sunday	13:35 – 14:10
Dx	Sunday	14:15 – 16:25
Ex	Sunday	16:45 – 18:03
1A	Sunday	18:15 – 19:00
1B	Sunday	18:15 – 19:00
F1 (Reception)	Sunday	19:00 – 21:30
Gx	Monday	08:00 – 10:10
Hx	Monday	10:30 – 12:40
Jx	Monday	14:00 – 14:35
Kx	Monday	14:40 – 15:15
Lx	Monday	15:35 – 18:11
Mx	Tuesday	08:00 – 10:10
Nx	Tuesday	10:30 – 11:05
Px	Tuesday	11:10 – 11:30
Rx	Tuesday	13:05 – 15:41

Program Summary

All sessions will be at the Pittsburgh Convention Center unless noted.

Sunday, 24 November

08:00 – 09:57 Concurrent Sessions

9:57 – 10:25 Refreshment Break

10:25 – 12:20 Awards Presentations

12:20 – 13:35 Lunch

Program Summary

12:25 – 13:25 Young Investigator Workshop
(ticketed event) ..... Westin Westmoreland Room

13:35 – 14:10 Invited Lectures
C27 Invited Lecture: Roughness Effects on Wall-Bounded Turbulent Flows ..... Ballroom A
C28 Invited Lecture: Microfluidic Flows of Complex Suspensions: From Flexible Polymers to Swimming Bacteria ..... Ballroom B/C

14:10 – 14:15 Mini Break

14:15 – 16:25 Concurrent Sessions
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D2 Convection and Buoyancy-Driven Flows II: Heat Transfer 324
D3 Multiphase Flows II 325
D4 DFD Minisymposium: Nanobubbles 326
D5 CFD II: LES I 327
D6 Microfluids: Flow in Microchannels 328
D7 Microfluids: Oscillation 329
D8 Particle-Laden Flows II: Experimental Studies 330
D9 Instability: Interfacial and Thin-Film II 333
D10 Geophysical: Oceanographic II 334
D11 Bubbles II: Cavitation, Acoustics and Biomedical 335
D12 Vortex Dynamics and Vortex Flows II 336
D13 Focus Session: Marine Hydrokinetic Energy Conversion II 301
D14 Experimental Techniques II: Aerodynamics/Wind Tunnel 302
D16 Biofluids: Physiological II - Computational Blood Flow in Arteries 304
D17 Biofluids: Locomotion II – Swimming 305
D18 Biofluids: General II - Collective Behavior and Microswimmers 306/307
D19 Biofluids: Cellular I - Computational Studies on Cellular Kinematics 310/311
D20 Boundary Layers III: Flow over Roughness Elements 315
D21 Turbulence: Simulations II - DNS and LES I 316
D22 Turbulence Modeling III 317
D23 Turbulence: Theory II – General 318
D24 Acoustics II 319
D25 Flow Control II: Jets 320
D26 Reacting Flows II: DNS/LES/RANS 321
D27 Transonic and Turbomachinery CFD ..... Ballroom A
D28 Free-Surface Flows II ..... Ballroom B/C
D30 Porous Media Flows II: Mixing and Turbulence 408
D31 Porous Media Flows III: Wicking, Drying and Displacement of Immiscible Fluids 402
D32 Surface Tension Effects II: Interfacial Flows 403
D33 Drops III: Electric Field Effects 404
D34 Drops IV: Particle-Laden Drops 405
D35 Suspensions II: Fluid-Particle Interactions 406
D36 Instability: General I 407

16:25 – 16:45 Refreshment Break

Program Summary

16:45 – 18:03 Concurrent Sessions

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E2 Convection and Buoyancy-Driven Flows III: Thermal Instability 324
E3 Multiphase Flows III 325
E5 CFD III: LES II 327
E6 Microfluids: Particles I - Orientation and Self-Assembly 328
E7 Microfluids: Porous Media 329
E8 Particle-Laden Flows III: Particle-Turbulence Interaction 330
E9 Biofluids: General III - Pumping Phenomena 333
E10 Jets II 334
E11 Bubbles III: Soap, Films and Foams 335
E12 Vortex Dynamics and Vortex Flows III 336
E13 Focus Session: Marine Hydrokinetic Energy Conversion III 301
E14 Experimental Techniques III: Pressure Sensitive Paint 302
E16 Biofluids: Physiological III - Experimental Studies in Cardiovascular Flows 304
E17 Biofluids: Locomotion III – Flying 305
E18 Flow Visualization 306/307
E19 Rarefied Gases and DSMC 310/311
E20 Boundary Layers IV: Flow through Pipes 315
E21 Biofluids: Physiological IV - Experimental Studies in Respiratory Flows 316
E23 Turbulence: Theory III - Wall-Bounded Flows 318
E24 Aerodynamics I 319
E25 Flow Control III - Drag Reduction 320
E26 Reacting Flows III: Coal & Soot 321
E27 Supersonic and Hypersonic Flows: Shock Capturing and Focusing ..... Ballroom A
E28 Viscous Flows I: Flow Past Interferences ..... Ballroom B/C
E30 Turbulence: Shear Layers I – Simulations 408
E31 Porous Media Flows IV: Electrochemical and Heat Transfer Devices 402
E32 Surface Tension Effects III: General Interfacial Phenomena 403
E33 Drops V: Buoyancy-Driven Motion 404
E34 Drops VI: Bouncing Drops 405
E35 Suspensions III: Confined Flows 406
E36 Waves I 407

18:15 – 19:00 Session 1A Student Poster Session ..... South Terrace Foyer

18:15 – 19:00 Session 1B Poster Session ..... Ballroom Gallery

19:00 – 21:30 APS/DFD Reception ..... Noresco Riverside Terrace & Exhibit Hall A

Program Summary

Monday, 25 November

08:00 – 10:10 Concurrent Sessions

10:10 – 10:30 Refreshment Break

10:30 – 12:40 Concurrent Sessions

Program Summary

10:30 – 12:40 Concurrent Sessions (continued)

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H10 Instability: Wakes II - Non-Cylindrical Objects and Wind Tunnels 334
H11 Bubbles V: Rising Bubbles and Surface Interaction 335
H12 Vortex Dynamics and Vortex Flows VI 336
H13 Granular Flows II: Applications 301
H14 Experimental Techniques V: Two-Phase/Ablation 302
H16 Reacting Flows V: Kinetics 304
H17 Biofluids: Locomotion VI - Swimming and Flapping Models 305
H18 Biofluids: General IV - Plant Biomechanics 306/307
H19 Biofluids: Cellular III - Computational Studies on Mechanical Properties of Cellular Flows 310/311
H20 DFD/GPC Minisymposium: Global Climate Models: Dynamical Cores, Strengths and Weaknesses 315
H21 Turbulence: Simulations IV - DNS Application 316
H22 Turbulent Mixing II 317
H23 DFD Minisymposium: Frontiers in Combustion Physics I 318
H24 Aerodynamics III 319
H25 Flow Control V: Injection/Suction 320
H26 Reacting Flows VI: Premixed 321
H28 Waves III ..... Ballroom B/C
H30 Compressible Flows I: DNS 408
H31 Porous Media Flows VI: Imbibition and Injection 402
H32 Viscous Flows II: Flows in Viscous Fluids 403
H33 Drops IX: Evaporating Sessile Drops 404
H34 Drops X: Splashing on Heated Surfaces 405
H35 Chaos, Fractals, and Dynamical Systems II: Analysis, Prediction, and Control 406
H36 Geophysical: Oceanographic V 407

12:40 – 14:00 Lunch

12:45 – 13:45 Student Lunch (Ticketed Event) ..... Westin Westmoreland Room

12:45 – 13:45 Fluids Education Lunch Workshop ..... Westin Cambria Room West

12:45 – 14:00 Women in Fluids Network Lunch ..... Sonoma Grill 947 Penn Avenue

14:00 – 14:35 Invited Lectures

J27 Invited Lecture: Do Swimming Animals Mix the Ocean? ..... Ballroom A
J28 Invited Lecture: Dynamics of Transient Liquid Injection ..... Ballroom B/C

Program Summary

14:35 – 14:40 Mini Break

14:40 – 15:15 Invited Lectures

K27 Invited Lecture: Porous-medium Convection: New Problems from CO_2 Sequestration ..... Ballroom A

K28 Invited Lecture: Drag Reduction and the Dynamics of Turbulence in Simple and Complex Fluids..... Ballroom B/C

15:15 – 15:35 Refreshment Break

15:25 Announcement of Gallery of Fluid Motion Award Winners and Poster Session Winners ..... Exhibit Hall A

15:35 – 18:11 Concurrent Sessions

L1 Geophysical: Oceanographic VI 323

L2 Convection and Buoyancy-Driven Flows V: Binary Systems and Stratified Flows..... 324

L3 Multiphase Flows VI 325

L4 General Fluid Dynamics I: Drag Reduction 326

L5 CFD VI..... 327

L6 Microfluids: Fluidic Devices II..... 328

L7 Microfluids: Particles III - Droplets and Emulsions 329

L8 Magnetohydrodynamics II 330

L9 Instability: Interfacial and Thin-Film V..... 333

L10 Instability: General II 334

L11 Non-Newtonian Flows I..... 335

L12 Vortex Dynamics and Vortex Flows VII..... 336

L13 Granular Flows III: Jamming, Cooling and Force Transmission ..301

L14 Experimental Techniques VI: Turbulence/Fluorescence 302

L16 Biofluids: Medical Devices 304

L17 Biofluids: Locomotion VII - Active Suspensions and Bacteria 305

L18 Biofluids: General V 306/307

L19 Nanofluids I 310/311

L20 Boundary Layers VI: Channel Flow and Flows over Superhydrophobic Walls 315

L21 Turbulence: Simulations V 316

L22 Turbulence: Mixing III 317

L23 Turbulence: Theory V – Measurements..... 318

L24 Aerodynamics IV..... 319

L25 Vortex Dynamics and Vortex Flows VIII..... 320

L26 Reacting Flows VII: Experiments 321

L28 Biofluids: General VI - Fluid Film Flows ..... Ballroom B/C

L30 Instability: Rayleigh-Taylor II 408

L31 Free-Surface Flows III..... 402

L32 Geophysical: General I - Rotating Flows 403

L33 Drops XI: Levitation and Propulsion on Surfaces 404

L34 Drops XII: Elastic Surfaces and Fibers 405

L35 Chaos, Fractals and Dynamical Systems III: Miscellaneous Topology and Model Characterization 406

L36 Flow Control VI: Systems and Mechanisms 407

Program Summary

17:00 – 18:30 Meet the APS Journal Editors Reception ..... West Atrium

19:00 – 20:30 Geophysical Fluid Dynamics Reception ..... Westin Pennsylvania Ballroom

Tuesday, 26 November

08:00 – 10:10 Concurrent Sessions

Program Summary

10:10 – 10:30 Refreshment Break

10:30 – 11:05 Invited Lectures

N27 Invited Session: Transverse Jet Shear Layer Instabilities and Their Control ..... Ballroom A

N28 Invited Session: Swimming and Running through Sand: Resistive Force Theory in Granular Media ..... Ballroom B/C

11:05 – 11:10 Mini Break

11:10 – 11:30 Invited Lectures

P27 Invited Session: Andreas Acrivos Dissertation Award Talk: Turbulence and Internal Waves in Tidal Flow over Topography .. Ballroom A

P28 Invited Session: François N. Frenkiel Award Talk: Shock Structure in Shock-Turbulence Interactions ..... Ballroom B/C

11:30 – 13:05 Lunch

13:05 – 15:41 Concurrent Sessions

R1 Geophysical: General III - Open Channels and Sedimentation ... 323

R2 Convection and Buoyancy-Driven Flows VII: Gravitational Effects and Flows Past Moving Bodies 324

R3 Multiphase Flows VIII 325

R4 Instability: Boundary Layers I - Surface Topography 326

R5 CFD VIII: Numerical Methods II 327

R6 Nanofluids III 328

R7 Multiphase Flows IX 329

R8 General Fluid Dynamics IV: Theory II 330

R9 Bubbles VI: Nanobubbles and Acoustics 333

R10 General Fluid Dynamics V 334

R11 Non-Newtonian Flows III 335

R12 Vortex Dynamics and Vortex Flows X 336

R13 Granular Flows V: Fluctuations and Instabilities 301

R14 Rotating Flows II 302

R16 Aerodynamics V 304

R17 Biofluids: Locomotion XI - Microswimmers and Bacteria II 305

R18 CFD IX 306/307

R19 Boundary Layers VIII: Experimental 310/311

R20 Boundary Layers IX: Numerical Simulation 315

R21 Biofluids: Locomotion XII - Microswimmers and Bacteria III 316

R22 DFD Minisymposium: Frontiers in Combustion Physics II 317

R23 Biofluids: Physiological VI - Experimental Studies in Blood Flows 318

R24 Biofluids: Physiological VII - Human Voice System Flows 319

R25 Flow Control VIII: Surface Modulation, Interface Speed and Other Effects 320

R26 Biofluids: Locomotion XIII - Bacteria/Flapping 321

R28 Industrial Applications II ..... Ballroom B/C

R30 Microfluids: Microchannels 408

Program Summary

13:05 – 15:41 Concurrent Sessions (continued)

66th Annual Meeting of the Division of Fluid Dynamics

24 – 26 November 2013

Schedule of Papers

Sunday, 24 November 2013
Sessions A – E

Sunday Morning, 24 November 2013						
Session	**08:00**	**08:13**	**08:26**	**08:39**	**08:52**	**09:05**
A1. Geophysical: Atmospheric I Room: 323 Chair: W. Layton, U. of Pittsburgh	**A1.01** Coupling building-resolving LES with meso-scale NWP: effect of the simulation parameters *K. Yeo*	**A1.02** Measurements of Roughness Length and Displacement Heights in Model Urban Canopies *A. Rahman, P. Huq, F. Camelli*	**A1.03** Coupled Convective and Radiative Heat Transfer Simulation for Urban Environments *S. Gracik, M. Sadeghipour, G. Pitchurov, J. Liu, M. Heidarinejad, J. Srebric*	**A1.04** Modeling and measuring neighborhood scale flow, turbulence, and temperature within Chicago heat island *P. Conry, A. Sharma, L. Leo, H. Fernando, M. Potosnak, J. Hellmann*	**A1.05** Quantifying the effect of inflow variability in RANS simulations of the JU2003 field experiment *C. Gorle, C. Garcia Sanchez, D. Philips, G. Iaccarino*	**A1.06** WITHDRAWN .
A2. Convection and Buoyancy-Driven Flows I: Numerical Simulations Room: 324 Chair: H. Johnston, U. of Massachusetts - Amherst	**A2.01** High Rayleigh number simulations in a cylinderical cell with aspect-ratio 1/3 *E. van der Poel, R. Verzicco, D. Lohse*	**A2.02** Numerical simulations of high Rayleigh, Prandtl and Schmidt number flows using multiple space/time resolutions *R. Verzicco, R. Ostilla Monico, E. van der Poel, D. Lohse*	**A2.03** Effects of Velocity and Temperature Boundary Conditions in Turbulent Thermal Convection *H. Johnston, D. Goluskin, C. Doering, G. Flierl*	**A2.04** Solutions to inverse plume in a crosswind problem using a predictor – corrector method *J. VanderVeer, Y. Jaluria*	**A2.05** Time-dependent dynamics of fluid temperature driven by a constant temperature vertical wall in an insulated space *R. Bonnebaigt, C. Caulfield, P. Linden*	**A2.06** Buoyancy-driven flow around $A + B \rightarrow C$ reaction fronts propagating in Hele-Shaw cells: Parabolic flights experiments and numerical simulations *L. Rongy, K. Eckert, A. De Wit*
A3. Multiphase Flows I Room: 325 Chair: S. Ling, Universite Pierre et Marie CURIE	**A3.01** Acceleration of non-Newtonian multiphase flow computations via CPU-GPU platforms *A. Fernandez*	**A3.02** Buoyancy effects on rotation and translation of large particles in turbulent flow *M. Byron, Y. Tao, E. Variano*	**A3.03** Experimental Investigation of Two Phase Fluid Flow and Passive Scalar Mixing around a Periodic Array of Spheres *M. Ramezani, S. Subramaniam, M. Olsen*	**A3.04** A unified model from dense and dilute compressible multiphase flows - application to explosive dispersal *Y. Ling, S. Balachandar, T. McGrath, J. St. Clair*	**A3.05** A new drag force model based on drift flux for gas-particle two-phase flow *Z. Shang, J. Lou, H. Li*	**A3.06** Analysis of turbulent cavitating flow in a micro channel *C. Egerer, S. Hickel, S. Schmidt, N. Adams*
A4. Boundary Layers I: Shock Wave Boundary Layer Interaction Room: 326 Chair: F. Alvi, Florida State U.	**A4.01** The Anatomy of a Shock-Boundary Layer Interaction in Hypervelocity Flow *A. Knisely, A. Swantek, J. Austin*	**A4.02** Response of Hypervelocity Boundary Layers to Global and Local Distortion *W. Flaherty, J. Austin*	**A4.03** *A priori* estimates of subgrid-scale terms for LES of shock-boundary layer interactions *A. Jammalamadaka, F. Jaberi*	**A4.04** Multi-fidelity numerical simulations of shock/turbulent-boundary layer interaction with uncertainty quantification *I. Bermejo-Moreno, L. Campo, J. Larsson, M. Emory, J. Bodart, F. Palacios, G. Iaccarino, J. Eaton*	**A4.05** Conditional Analysis of a Shock Wave and Turbulent Boundary Layer Interaction *J. Li, S. Priebe, M. Martin*	**A4.06** Characterization of the Shear Layer in a Mach 3 Shock/Turbulent Boundary Layer Interaction *C. Helm, S. Priebe, J. Li, P. Dupont, P. Martin*
A5. CFD I: Immersed Boundary Methods Room: 327 Chair: S. Xu, Southern Methodist U.	**A5.01** A sharp, robust, and conservative geometric immersed boundary technique for moving boundaries *P. Brady, O. Desjardins, P. Pepiot*	**A5.02** Derivation of jump conditions for the immersed interface method with a triangular mesh of an interface *G. Pearson, S. Xu*	**A5.03** The immersed interface method for fluid-solid interaction with boundary condition capturing on triangular meshes *S. Xu*	**A5.04** Model order reduction of embedded boundary models *M. Balajewicz, C. Farhat*	**A5.05** Direct Numerical Simulations of Solid-Fluid Flows Using a Variant of immersed boundary method in Gerris *P. Shui, P. Valluri, S. Popinet*	**A5.06** An efficient boundary condition enforced-immersed boundary method for thermal flows with heat flux condition *W. Ren, C. Shu, W. Yang, Y. Chen*
A6. Microfluids: Mixing Room: 328 Chair: I. Mezic, U. of California, Santa Barbara	**A6.01** Synergetic Fluid Mixing from Viscous Fingering and Alternating Injection *B. Jha, L. Cueto-Felgueroso, R. Juanes*	**A6.02** The Impact of Miscible Viscous Fingering on Mixing *J. Chui, P. de Anna, R. Juanes*	**A6.03** Diffusive and inertial instabilities during miscible fluid thread formation in microgeometries *T. Cubaud, S. Notaro*	**A6.04** Diffusion Effects on the Chaotic Fluid Mixing for AC Electrothermal Flows by Blinking Vortices *S. Loire, I. Mezic*	**A6.05** AC Electrokinetic 3D blinking micro-mixer *M. Sigurdson, S. Loire, M. Budisic, I. Mezic*	**A6.06** Effective mixing strategies with microbubble streaming flows *C. Wang, B. Rallabandi, L. Guo, S. Hilgenfeldt*
A7. Microfluids: Interfaces and Wetting I Room: 329 Chair: K. Breuer, Brown U.	**A7.01** New thermal-sensitive superhydrophobic material *R. Thevenin, Z. Wu, P. Keller, R. Cohen, C. Clanet, D. Quere*	**A7.02** A generalised view of high frequency substrate vibration induced wetting (Acoustowetting) *O. Manor, A. Rezk, J. Friend, L. Yeo*	**A7.03** Dynamics of Wetting of Ultra Hydrophobic Surfaces *A. Mohammad Karim, J. Kim, J. Rothstein, P. Kavehpour*	**A7.04** Dynamic wetting at the nanoscale *G. Amberg, Y. Nakamura, A. Carlson, J. Shiomi*	**A7.05** Hard-sphere and inertial effects in colloidal liquid-gas systems *A. Nold, B. Goddard, S. Kalliadasis*	**A7.06** Electrostatic line tension resulting from fluid-fluid interfacial deformation *A. Doerr, S. Hardt*
A8. Particle-Laden Flows I: Liquid-Solid Flows Room: 330 Chair: A. Prosperetti, Johns Hopkins U.	**A8.01** Natural particles in turbulent aquatic environments: when do they differ from fluid parcels? *E. Variano, L. Mazzaro, M. Byron, R. Allen, I. Tse*	**A8.02** The motion of spherical particles falling in a cellular flow field *E. Guazzelli, G. Bouchet, L. Bergougnoux*	**A8.03** Modeling the rheology of concentrated fluid-sediment mixtures *A. Penko, J. Simeonov, J. Calantoni*	**A8.04** Numerical modeling of bidensity suspensions in gravity-driven, thin-film flows *J. Wong, S. Lee, A. Mavromoustaki, A. Bertozzi*	**A8.05** Erosion and transport of particulates by forced jet impinging jet on a mobile sediment bed *K. Corfman, R. Mulinti, K. Kiger*	**A8.06** Collision Driven Particle Dynamics Simulations for Analyzing Flows of Particulate Sprays and Jets *D. Mukherjee, T. Zohdi*
A9. Instability: Interfacial and Thin-Film I Room: 333 Chair: G. Settles, Pennsylvania State U.	**A9.01** Simultaneous measurement of a thickness and wave velocity of a liquid film flow, by using a single-tip optical fiber probe *H. Furuichi, T. Saito*	**A9.02** Nonlinear interfacial dynamics in stratified multilayer channel flows *D. Papageorgiou, E. Papaefthymiou, G. Pavliotis*	**A9.03** Instabilities and nonlinear waves in two-layer film flowing down a vertical plane *G. Cekic, G. Sisoev*	**A9.04** Coherent structures in non-local active-dissipative equations *T. Lin, M. Pradas, S. Kalliadasis, D. Papageorgiou, D. Tseluiko*	**A9.05** Linear and nonlinear instability and ligament dynamics in 3D laminar two-layer liquid/liquid flows *L. Ó Náraigh, P. Valluri, D. Scott, I. Bethune, P. Spelt*	**A9.06** Contact line instability of gravity-driven flow of power-law fluids: Comparison of Experiments and Simulations *B. Hu, H. Clever, S. Kieweg*

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A10. Jets I: Swirling, Mixing and Multiphase Room: 334 Chair: K. T. Kiger, U. of Maryland	**A10.01** Stability of swirling coaxial jets *J. Weller-Calvo, L. Joly, J. Fontane*	**A10.02** Axial Evolution of Helical Modes in Reacting Swirl Flow *M. Aguilar, B. Emerson, D. Noble, T. Lieuwen*	**A10.03** The coiling of electrified liquid jets *J. Rivero Rodriguez, M. Pérez-Saborid*	**A10.04** Study of the turbulent diffusive flux for tracer dispersion in quasi-two-dimensional turbulent jets *J. Landel, D. Foures, C. Caulfield*	**A10.05** Optimum viscous flow in pressure-swirl atomizers *G. Amini, A. Pereira, S. Yun, X. Li*	**A10.06** Structure, Mixing, and Stability of Flush and Elevated Jets in Crossflow *L. Gevorkyan, D. Getsinger, T. Peng, O. Smith, A. Karagozian*
A11. Bubbles I: Cavitation, Nucleation and Ventilation Room: 335 Chair: T. Colonius, California Institute of Technology	**A11.01** Pressures induced by collapsing cavitation bubbles near boundaries *J. Hartenberger, R. Gaudron, E. Johnsen, S. Ceccio*	**A11.02** Inertial cavitation threshold in nonlinear viscoelastic media *M. Warnez, E. Johnsen*	**A11.03** Cavitation dynamics in a viscoelastic medium with nonlinear elasticity *R. Gaudron, E. Johnsen*	**A11.04** Detailed Simulations of Bubble-Cluster Collapse Adjacent Material Surfaces *A. Tiwari, C. Pantano, J. Freund*	**A11.05** Shear stresses and temperatures during the collapse of a bubble near a rigid wall *S. Alahyari Beig, E. Johnsen*	**A11.06** Why does a beer bottle foam up after a sudden impact on its mouth? *J. Rodriguez-Rodriguez, A. Casado-Chacon, D. Fuster*
A12. Vortex Dynamics and Vortex Flows I Room: 336 Chair: J. Bull, U. of Michigan	**A12.01** Vortical wake evolution and its effect on performance using Lagrangian coherent structures *T. Jeter, M. Green*	**A12.02** Zero-Net Mass-Flux Actuator Cavity Vortex *M. Krieg, K. Mohseni*	**A12.03** Evolution of the pressure thrust in a starting jet *L. Gao, S. Yu, J. Schluter*	**A12.04** Impact of Cyclical Pulse Behavior on Toroidal Vortex Interaction *L. Salmon, J. Baker*	**A12.05** Nested contour-dynamic models for axisymmetric vortex rings and vortex wakes *C. O'Farrell, J. Dabiri*	**A12.06** Optimal propulsive efficiency of vortex enhanced propulsion *R. Whittlesey, J. Dabiri*
A13. Focus Session: Marine Hydrokinetic Energy Conversion I Room: 301 Chair: L. Beninati, Bucknell U.	**A13.01** Interaction between an axial-flow model hydrokinetic turbine and an erodible channel *C. Hill, M. Musa, L. Chamorro, M. Guala*	**A13.02** Tow tank measurements of turbulent flow in the near wake of a horizontal axis marine current turbine under steady and unsteady inflow conditions *L. Luznik, M. Van Benthem, K. Flack, E. Lust*	**A13.03** An investigation into blockage corrections for cross-flow hydrokinetic turbine performance *R. Cavagnaro, B. Polagye*	**A13.04** Performance and cavitation characteristics of bi-directional hydrofoils *I. Nedyalkov, M. Wosnik*	**A13.05** Experimental characterization of marine hydrokinetic (MHK) turbine array performance *N. Stelzenmuller, A. Aliseda*	**A13.06** Reynolds number effects on the performance and near-wake of a cross-flow turbine *P. Bachant, M. Wosnik*
A14. Experimental Techniques I: PIV Algorithms Room: 302 Chair: K. Christensen, U. of Illinois at Urbana-Champaign	**A14.01** Direct calculation of the weighting function and depth of correlation in Micro-Particle Image Velocimetry (Micro-PIV) from particle images *M. Hein, B. Wieneke, R. Seemann*	**A14.02** Direct Measurement of Rotation and Scaling in Particle Image Velocimetry using the Fourier-Mellin Transform *M. Giarra, J. Charonko, P. Vlachos*	**A14.03** A general approach for time-supersampling of 3D-PIV data by the vortex-in-cell method *F. Scarano, J. Schneiders, R. Dwight*	**A14.04** Divergence-free filtering and pressure determination from 3D velocimetry: applications to flows of industrial and biomedical relevance *D. Schiavazzi, F. Coletti, J. Bodart, J. Eaton*	**A14.05** A Comparison of 3D3C Velocity Measurement Techniques *R. La Foy, P. Vlachos*	**A14.06** Quantitative PIV measurement in narrow channels *D. Ehyaei, K. Kiger*
A16. Biofluids: Physiological I - Computational Studies in Cardiovascular Flows Room: 304 Chair: M. Bukac, U. of Pittsburgh	**A16.01** Effect of Trabeculations on the Hemodynamics of Left Ventricle: A Computational Study *V. Vedula, J. Seo, R. George, A. Lardo, R. Mittal*	**A16.02** Fluid Dynamics of Contrast Dispersion in Coronary Arteries: Mechanism and Implications for Identification of Flow-Limiting Lesions *P. Eslami, J. Seo, A. Lardo, R. Mittal*	**A16.03** Hemodynamics and flow-vessel interaction in patient-specific aorta using unified lattice Boltzmann computation and simulation *H. Yu, Z. Wang, Y. Zhao, S. Teague*	**A16.04** Coupled Hemodynamic-Biochemical Modeling of Thrombus Formation in Infarcted Left Ventricles *J. Seo, V. Vedula, R. George, R. Mittal*	**A16.05** Patient-specific simulation of a trileaflet aortic heart valve in a realistic left ventricle and aorta *A. Gilmanov, T. Le, H. Stolarski, F. Sotiropoulos*	**A16.06** Computational study of the effect of dynamic wall confinement on ventricular filling *X. Zheng, Q. Xue*
A17. Biofluids: Locomotion I - Swimming and Flapping Room: 305 Chair: M. Plesniak, George Washington U.	**A17.01** On the hydrodynamics of fish schooling *I. Borazjani, M. Daghooghi*	**A17.02** The lateral line system of fish as a "hydrodynamic antenna" *J. Zhang, L. Ristroph, J. Liao*	**A17.03** Reduced-order model of fish-like swimming due to shedding of unsteady point vortices *P. Tallapragada*	**A17.04** Flow Structures and Efficiency of Swimming Fish school: Numerical Study *Y. Yatagai, Y. Hattori*	**A17.05** Computational design of flapping kinematics of a flexible finite-span foil *S. Hong, J. Lee, D. You*	**A17.06** Critical Point Analysis of Unsteady Flow Separation from a Pitching Plate *F. Hooman, P. Krueger*
A18. Biofluids: General I - Vesicle Modeling and Simulations Room: 306/307 Chair: S. Mendez, Centre national de la recherche scientifique (CNRS)	**A18.01** Three-Dimensional Immersed Interface Method Based Vesicle Simulations *P. Gera, D. Salac*	**A18.02** Numerical simulations of capsules and red blood cells under flow in complex geometries at non-zero Reynolds numbers *S. Mendez, E. Gibaud, J. Siguenza, F. Nicoud*	**A18.03** Phase-Field Modeling of Lipid Vesicles With Pores *S. Seifi, D. Salac*	**A18.04** Asymmetric Instability, Symmetric Instability, and Pearling of a Vesicle in Extensional Flow *A. Spann, V. Narsimhan, E. Shaqfeh*	**A18.05** Lateral migration of a 3D elastic capsule in a Poiseuille flow *B. Kim, H. Sung*	**A18.06** The Electrohydrodynamics of Lipid Bilayer Vesicles in AC and DC Fields *L. McConnell, P. Vlahovska, M. Miksis*
A19. Turbulence Modeling I Room: 310/311 Chair: N. Ansari, U. of Pittsburgh	**A19.01** A framework for Large Eddy Simulation (LES) based on spatiotemporal statistical information *P. Vedula, P. Attar, A. LaBryer*	**A19.02** A comparison of dynamic procedures for subgrid stresses in low- and high-speed channels *S. Ryu, G. Iaccarino*	**A19.03** Effects of filtering parameter value on simulation results *W. Liu, J. McDonough*	**A19.04** An improved dynamic non-equilibrium wall-model for large eddy simulation *G. Park, P. Moin*	**A19.05** A dynamic two-level large-eddy simulation method for high Reynolds number flows *R. Ranjan, S. Menon*	**A19.06** A new Hybrid Filtered Favre average for compressible LES *M. Germano, A. Abbà*

Sunday Morning, 24 November 2013						
Session	**08:00**	**08:13**	**08:26**	**08:39**	**08:52**	**09:05**
A20. Boundary Layers II: Structure Room: 315 Chair: M. Malik, NASA Langley	**A20.01** Large- and very-large-scale motions in wall-bounded flows up to $\delta^+ \approx 2000$ *J. Sillero, J. Jiménez*	**A20.02** An investigation of the very large scale motions in turbulent pipe flow *L. Hellström, A. Smits*	**A20.03** Hairpin Vortices: Autogeneration and Interaction *D. Sabatino, R. Maharjan, A. Sanders*	**A20.04** A study of synthetic large scales in turbulent boundary layers *S. Duvvuri, M. Luhar, C. Barnard, M. Sheplak, B. McKeon*	**A20.05** Spatial properties of large-scale structure in a turbulent boundary layer *J. Hwang, J. Lee, S. Jung, T. Zaki, H. Sung*	**A20.06** Study of Coherent Structures in Low Reynolds Number Zero Pressure Gradient Turbulent Boundary Layer *S. Patwardhan, O. Ramesh*
A21. Turbulence: Simulations I - LES Application Room: 316 Chair: J. Larsson, U. of Maryland	**A21.01** Wall-modeled large eddy simulation of high-lift devices from low to post-stall angle of attacks *J. Bodart, J. Larsson, P. Moin*	**A21.02** Wavelet-based adaptive LES of turbulent flow around a square-cylinder *G. De Stefano, O. Vasilyev*	**A21.03** Numerical Study of Impulse Actuated Stall Control *S. Haering, R. Moser*	**A21.04** Dynamic Immersed Boundary Method for Modeling of Turbulent Boundary Layers over Bio-Fouled Surfaces *X. Yang, J. Sadique, R. Mittal, C. Meneveau*	**A21.05** Computational Analysis of Particle Nucleation in Dilution Tunnels: Effect of Flow Configuration and Tunnel Geometry *S. Singh, P. Adams, A. Misquitta, K. Lee, E. Lipsky, A. Robinson*	**A21.06** Coherent eddies in flows over three-dimensional dunes *M. Omidyeganeh, U. Piomelli*
A22. Turbulence Modeling II Room: 317 Chair: R. Metcalfe, U. of Houston	**A22.01** By-pass mechanism for transition to turbulence in supercritical pipe flow *R. Adrian, X. Wu, P. Moin, J. Baltzer, J. Hickey*	**A22.02** Following analytically stages of transition in Couette flow *M. Karp, J. Cohen*	**A22.03** Early stages of transition in viscosity-stratified channel flow *R. Govindarajan, S. Jose, L. Brandt*	**A22.04** Transient growth of disturbances in near-wall region of turbulent channel flow *E. Kim, H. Choi, J. Kim*	**A22.05** Identification of spatially-localized flow structures via sparse proper orthogonal decomposition *N. Dhingra, M. Jovanovic, P. Schmid*	
A23. Turbulence: Theory I - General Room: 318 Chair: A. Attili, King Abdullah U. of Science and Technology	**A23.01** The definition of turbulence and the direction of the turbulence energy cascade *C. Gibson*	**A23.02** On Lagrangian and Eulerian Acceleration in Rotating and Sheared Homogeneous Turbulence *F. Jacobitz, K. Schneider, W. Bos, M. Farge*	**A23.03** Scale-Dependent Stress-Strain Rate Alignment and Spectral Transport in 2D Turbulence *Y. Liao, N. Ouellette*	**A23.04** Classical Turbulence Scaling and Intermittency in Strongly Stratified Turbulence *S. de Bruyn Kops*	**A23.05** Scaling of Lyapunov Exponents in Homogeneous, Isotropic DNS *N. Fitzsimmons, N. Malaya, R. Moser*	**A23.06** Using information theory for turbulence prediction: a statistical approach *W. Goldburg, R. Cerbus*
A24. Acoustics I Room: 319 Chair: D. Bodony, U. of Illinois at Urbana-Champaign	**A24.01** The effect of sweep on forward-step noise *J. Hao, M. Wang*	**A24.02** Computational Study of Shock-Associated Noise Characteristics Using LES *J. Liu, A. Corrigan, K. Kailasanath, N. Heeb, D. Munday, E. Gutmark*	**A24.03** Noise prediction from external flows using Ffowcs-Williams and Hawkings techniques *Z. Nitzkorski, K. Mahesh*	**A24.04** Vortex Noise Reductions from a Flexible Fiber Model of Owl Down *J. Jaworski, N. Peake*	**A24.05** Interaction of a turbulent boundary layer with a cavity-backed circular orifice and tonal acoustic excitation *Q. Zhang, D. Bodony*	**A24.06** Experimental validation of the directional sensitivity of the acoustic radiation force to particle diameter *W. Ran, J. Saylor*
A25. Flow Control I: Coherent Structures and Vortices Room: 320 Chair: S. Schmitz, Pennsylvania State U.	**A25.01** Large-scale coherent structures in fractal-generated, axisymmetric wakes *J. Nedic, O. Supponen, B. Ganapathisubramani, J. Vassilicos*	**A25.02** Plasma Streamwise Vortex Generators in an Adverse Pressure Gradient *C. Kelley, T. Corke, F. Thomas*	**A25.03** Suppression of Wake Vortices Using Periodic Cross-Section Variations *A. Bouabdallah, H. Oualli, A. Benlahnache, Y. Menad, M. Gad-el-Hak*	**A25.04** Effect of the cross sectional aspect ratio on the flow past a twisted cylinder *J. Jung, H. Yoon*	**A25.05** Multi-Point Velocity Correlations in the Wake of a Three-Dimensional Bluff Body *P. Shea, M. Glauser*	**A25.06** Dynamic modeling of a turbulent axisymmetric bluff-body wake *G. Rigas, A. Morgans, J. Morrison*
A26. Reacting Flows I: Detonation Room: 321 Chair: J. Philip Drummond, NASA Langley	**A26.01** What Zeldovich did not tell us about spontaneous reaction wave propagation *D. Kassoy*	**A26.02** Pulsed Detonation Operation of an Axial Turbine *D. Munday, A. St. George, R. Driscoll, E. Gutmark*	**A26.03** On the development of Hydrogen-air detonations *C. Romick, T. Aslam, J. Powers*	**A26.04** Analytical and Computational Study of Flame Acceleration due to Wall Friction in Combustion Tubes and Channels *B. Demirgok, V. Akkerman*	**A26.05** Spontaneous Deflagration-to-Detonation Transition in Thermonuclear Supernovae *A. Poludnenko, V. Gamezo, E. Oran*	**A26.06** Boundary Layer Effects on Ignition in a Shock-Tube System *K. Grogan, M. Ihme*
A28. Free-Surface Flows I Room: Spirit of Pittsburgh Ballroom B/C Chair: J. Crockett, Bringham Young U.	**A28.01** Jet impingement and thin film breakup on a superhydrophobic surface *J. Crockett, J. Prince, D. Maynes*	**A28.02** Absolute and convective instabilities in film flow over inclined topography *D. Tseluiko, M. Blyth, D. Papageorgiou*	**A28.03** The miscible two-fluid flow down an inclined plane: Linear stability analysis *R. Usha, R. Govindarajan, O. Tammisola*	**A28.04** Thin film flow down a porous substrate in the presence of a soluble surfactant: Linear stability analysis *Y. Anjalaiah, R. Usha*	**A28.05** Recoil of a liquid filament: escape of the pinch-off by creation of a vortex ring *J. Hoepffner, G. Pare*	**A28.06** Spinning hydraulic jump *H. Abderrahmane, A. Kasimov*
A30. Instability: Richtmyer-Meshkov Room: 408 Chair: D. Ranjan, Texas A&M U.	**A30.01** Large Eddy Simulation Requirements for the Richtmyer-Meshkov Instability *B. Olson, J. Greenough*	**A30.02** Experimental Parametric Study of the Inclined Interface Richtmyer-Meshkov Instability *J. McFarland, S. Creel, D. Reilly, C. McDonald, J. Greenough, D. Ranjan*	**A30.03** Experimental Study of the Richtmyer-Meshkov Instability on a Coupled Multimode and Inclined Interface Perturbation *D. Reilly, S. Creel, J. McFarland, J. Mitruka, C. McDonald, D. Ranjan*	**A30.04** Inclined Interface Richtmyer-Meshkov Instability: Reshock Study *S. Creel, J. McFarland, D. Reilly, C. McDonald, S. Smith, D. Ranjan*	**A30.05** Comparison of mixing zone thicknesses from two measurement campaigns on Richtmyer-Meshkov induced mixing *J. Haas, D. Counilh, L. Schwaederle, G. Bouzgarrou, Y. Bury, S. Jamme, L. Joly*	**A30.06** Three-dimensional features of shock-driven mixing flow *D. Olmstead, P. Vorobieff, C. Corbin, T. Bernard, P. Wayne, G. Kuehner, C. Truman*

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A31. Porous Media Flows I - General Room: 402 Chair: D. Lester, CSIRO	**A31.01** A comprehensive study of the lift generation in soft porous media under rapid compression *Q. Wu, R. Nathan, R. Crawford*	**A31.02** Characterisation of flux sensitivity to uncertainty in porous media *A. Evans, C. Caulfield, A. Woods*	**A31.03** Comparison of Experimental and Computational Methods in the Study of Flow in Porous Media *J. Liburdy, V. Patil, J. Finn, S. Apte*	**A31.04** Micro-scale flow simulation and colloid transport modeling in saturated porous media *Q. Qiu, Y. Jin, L. Wang*	**A31.05** Flow Intermittency, Dispersion, and Correlated Continuous Time Random Walks in Porous Media *P. de Anna, T. Le Borgne, M. Dentz, A. Tartakovsky, D. Bolster, P. Davy*	**A31.06** SPH numerical simulation of fluid flow through a porous media *J. Klapp-Escribano, E. Mayoral-Villa, M. Rodriguez-Meza, E. de la Cruz-Sanchez, L. Di G Sigalotti*
A32. Surface Tension Effects I: Particles and Structure at the Interface Room: 403 Chair: S. Wereley, Purdue U.	**A32.01** An asymmetric Cheerio: Torque on objects floating on a liquid interface *M. Miller, K. Nguyen, S. Mandre*	**A32.02** Designing spherical patchy particles for optimum surface activity at liquid-fluid interfaces *H. Rezvantalab, A. Hashemi, S. Shojaei-Zadeh*	**A32.03** The Effect of Contact Angle on the Orientation, Stability and Assembly of Dense Floating Cubes *J. Rothstein, M. Donnell, R. Daniello*	**A32.04** Estimation of Forces between Objects in the Cheerios Effect *K. Nguyen, M. Miller, S. Mandre*	**A32.05** Inter-particle interactions and assembly of ellipsoidal Janus particles at liquid interfaces *H. Rezvantalab, S. Rowe, S. Shojaei-Zadeh*	**A32.06** Induced phase transitions of nanoparticle-stabilized emulsions *S. Frijters, F. Günther, J. Harting*
A33. Drops I: Pinch-off and Coalescence Room: 404 Chair: J. Gordill, Universidad de Sevilla	**A33.01** Scaling transitions during the thinning of viscous dripping droplets *A. Castrejon-Pita, J. Castrejon-Pita, S. Thete, K. Sambath, E. Hinch, I. Hutchings, J. Lister, O. Basaran*	**A33.02** Analysis of scaling during pinch-off of Newtonian filaments by numerical simulation *S. Thete, K. Sambath, O. Basaran, R. Castrejón-Pita, A. Castrejón-Pita, I. Hutchings, J. Hinch, J. Lister*	**A33.03** Dynamics of Contracting Asymmetric Viscoelastic Filaments *C. Anthony, S. Thete, S. Appathurai, P. Bhat, O. Basaran, M. Harris*	**A33.04** Dynamics of contracting surfactant-covered filaments *P. Kamat, S. Thete, Q. Xu, O. Basaran*	**A33.05** Stretching and Rupture of Suspension Bridges, of the Fluid Variety *K. Connington, M. Miskin, T. Lee, M. Shattuck, J. Morris, H. Jaeger*	**A33.06** Inducing coalescence by a superposition of two Rayleigh-Plateau instabilities: Theoretical analysis *T. Driessen, P. Sleutel, F. Dijksman, R. Jeurissen, D. Lohse*
A34. Drops II: Drop Impact on Liquid Surfaces Room: 405 Chair: Y. Lian, Louisville U.	**A34.01** The effects of droplet characteristics on the surface features in a rain field *R. Liu, H. Brown, X. Liu, J. Duncan*	**A34.02** Numerical investigation of air film breakup and micro-bubble formation in liquid-liquid impact events *S. Mirjalili, A. Mani*	**A34.03** Dynamics of an air film entrapped by drop impact on liquid surface *J. Lee, B. Weon, S. Park, J. Jung, J. Kim, J. Pyo, K. Fezzaa, J. Je*	**A34.04** Surfactant effects on cumulative drop size distributions produced by air bubbles bursting on a non-quiescent free surface *K. Parmar, X. Liu, J. Duncan*	**A34.05** Sparkling Droplets: Aerosol Dispersion Resulting from Drop Impingement on Porous Surfaces *Y. Joung, C. Buie*	**A34.06** Rain Drops and Oil Slicks: Impact of Water Droplets on a Surface Oil Layer *D. Murphy, D. Morra, J. Katz*
A35. Suspensions I: Structure and Phase Transitions Room: 406 Chair: A. Colin, Universite de Bordeaux	**A35.01** An immersed boundary method for investigating the rheology of heavy crude oil *M. Daghooghi, I. Borazjani*	**A35.02** Acoustic Properties of Dilute Microstructured Suspensions: Theory and Experiment *W. Yuan, L. Liu, J. Shan*	**A35.03** Derivation of the rheological properties of a dilute suspension of spheres in a dilute polymer solution using the method of ensemble averaged equations *D. Koch, E. Lee, I. Mustafa*	**A35.04** Rheology and fluid mechanics of a hyper-concentrated biomass suspension *L. Botto, X. Xu*	**A35.05** Microstructure and rheology of colloidal suspension in simple shear and dynamic oscillatory flows: theory and simulation *E. Nazockdast, S. Marenne, J. Morris*	**A35.06** Reversible plastic regime in a 2D jammed material *N. Keim, P. Arratia*
A36. Geophysical: Oceanographic I Room: 407 Chair: P. Diamessis, Cornell U.	**A36.01** Modifications to Symmetric and Baroclinic Instabilities in the Presence of Surface Gravity Waves *S. Haney, B. Fox-Kemper, K. Julien*	**A36.02** Sea-surface manifestation of a submerged stratified turbulent wake via wake-emitted internal gravity waves *Q. Zhou, P. Diamessis*	**A36.03** The surface generation and downward propagation of internal waves in nonlinear stratifications *S. Ghaemsaidi, T. Peacock, T. Dauxois, S. Joubaud, P. Odier*	**A36.04** Characterization of the Vertical Energy Distribution of the Internal Wave Field in the Upper Ocean *J. Bruch*	**A36.05** Internal Solitary Wave Tunnelling *B. Sutherland, S. Keating, I. Shrivistava*	**A36.06** Mass transport by large and very-large amplitude mode-2 internal solitary waves: experimental observations *K. Shipley, A. Brandt*

Sunday Morning, 24 November 2013				
Session	**09:18**	**09:31**	**09:44**	**9:57**
A1. Geophysical: Atmospheric I Room: 323 Chair: W. Layton, U. of Pittsburgh	**A1.07** Approximate Deconvolution Large Eddy Simulation of Atmospheric Turbulence in Spectral Space *L. Nasr Azadani, A. Staples*	**A1.08** Direct Statistical Simulation of a Two-Layer Primitive Equation Model *W. Qi, B. Marston*	**A1.09** Radiative instabilities in vertically sheared rotating stratified flows *C. Millet, F. Lott*	**Refreshment Break**, 9:57–10:25 Exhibit Hall A
A2. Convection and Buoyancy-Driven Flows I: Numerical Simulations Room: 324 Chair: H. Johnston, U. of Massachusetts - Amherst	**A2.07** Non-Boussinesq exchange flow over topography *M. Jalaal, B. Stoeber, G. Lawrence*			
A3. Multiphase Flows I Room: 325 Chair: S. Ling, Universite Pierre et Marie CURIE	**A3.07** Pressure-driven displacement of a viscoplastic material by a Newtonian fluid *P. Swain, G. Karapetsas, O. Matar, K. Sahu*	**A3.08** Flow of a particulate mixture in a micro-channel *W. Wu, N. Aubry, M. Massoudi*	**A3.09** Two-Phase Flow Frictional Characteristics in Porous Wall Bounded Microchannels *E. Lee, J. Steinbrenner, C. Hidrovo, K. Goodson, J. Eaton*	
A4. Boundary Layers I: Shock Wave Boundary Layer Interaction Room: 326 Chair: F. Alvi, Florida State U.	**A4.07** Transient unsteadiness of SWBLI in an axisymmetric geometry *W. Baars, C. Tinney*	**A4.08** Constrained Large-eddy Simulation of Supersonic Turbulent Boundary Layer over a Compression Ramp *L. Chen, Z. Xiao, Y. Shi, S. Chen*		
A5. CFD I: Immersed Boundary Methods Room: 327 Chair: S. Xu, Southern Methodist U.	**A5.07** An Immersed Boundary-Lattice Boltzmann Method for Simulating Particulate Flows *B. Zhang, M. Cheng, J. Lou*	**A5.08** Algorithmic improvements for accurate force prediction in diffusive-interface direct-forcing immersed boundary method *X. Zhang, X. Zhu, G. He*	**A5.09** An implicit immersed boundary method for moving body problems in curvilinear coordinates *L. Nicolaou, S. Jung, T. Zaki*	
A6. Microfluids: Mixing Room: 328 Chair: I. Mezic, U. of California, Santa Barbara	**A6.07** Microfluidic mixing using orbiting magnetic microbeads *M. Ballard, D. Owen, W. Mao, P. Hesketh, A. Alexeev*	**A6.08** Two color laser induced fluorescence for high speed liquid droplet collision mixing in microchannels *M. Kim, A. Shahriari, N. Phillip, S. Zamani, C. Hidrovo*	**A6.09** Mixing and transport by ciliary carpets *Y. Ding, J. Nawroth, M. McFall-Ngai, E. Kanso*	
A7. Microfluids: Interfaces and Wetting I Room: 329 Chair: K. Breuer, Brown U.	**A7.07** The effect of velocity slip on the viscous fingering *A. He*	**A7.08** Velocity Slip on Curved Surfaces *W. Chen, R. Zhang, J. Koplik*	**A7.09** Measurements of a high-speed receding contact line on a hydrophobic surface *J. Park, K. Breuer*	
A8. Particle-Laden Flows I: Liquid-Solid Flows Room: 330 Chair: A. Prosperetti, Johns Hopkins U.	**A8.07** Pop up height of buoyant spheres *T. Truscott, R. Munns*	**A8.08** Shock Dynamics for particle-laden thin film *L. Wang, A. Bertozzi*		
A9. Instability: Interfacial and Thin-Film I Room: 333 Chair: G. Settles, Pennsylvania State U.	**A9.07** Spin coating flow of Power law fluid: spreading and contact line intsability *P. Doshi, A. Arora*	**A9.08** Engineering and control of surfactant-laden flows: experiments and MD simulations *N. Kovalchuk, P. Theodorakis, E. Muller, R. Craster, V. Starov, O. Matar*	**A9.09** New spreading law of thin film liquids controlled by gravity and vdW forces under thermal fluctuations *S. Nesic, R. Cuerno Rejado, E. Moro Egido*	

Sunday Morning, 24 November 2013				
Session	**09:18**	**09:31**	**09:44**	**9:57**
A10. Jets I: Swirling, Mixing and Multiphase Room: 334 Chair: K. T. Kiger, U. of Maryland	**A10.07** Dynamics of viscous fluid jets containing solid particles at low Reynolds number *M. Norton, T. Brugarolas, J. Chou, D. Lee, H. Bau*			**Refreshment Break**, 9:57–10:25 Exhibit Hall A
A11. Bubbles I: Cavitation, Nucleation and Ventilation Room: 335 Chair: T. Colonius, California Institute of Technology	**A11.07** Bubble cloud nucleation induced by the interaction between multiple laser-induced shocks and bubbles *P. Quinto-Su, K. Ando*	**A11.08** Ventilation of an hydrofoil wake *R. Arndt, S. Lee, G. Monson*	**A11.09** Improved Performance With Ventilation *E. Kawakami, S. Lee, A. Karn, J. Hong, R. Arndt*	
A12. Vortex Dynamics and Vortex Flows I Room: 336 Chair: J. Bull, U. of Michigan	**A12.07** Propulsion by active and passive airfoil oscillation *A. Mackowski, C. Williamson*	**A12.08** Formation of vortex pairs with hinged rigid flaps at the nozzle exit *P. Das, R. Govardhan, J. Arakeri*	**A12.09** The Formation of Turbulent Vortex Rings by Synthetic Jets *J. Lawson, J. Dawson*	
A13. Focus Session: Marine Hydrokinetic Energy Conversion I Room: 301 Chair: L. Beninati, Bucknell U.	**A13.07** Comparison of spatio-temporal resolution of different flow measurement techniques for marine renewable energy applications *V. Lyon, M. Wosnik*	**A13.08** Upstream blockage effect on the thrust force of a marine hydrokinetic device *G. Soliani, M. Beninati, M. Krane, A. Fontaine*	**A13.09** Scour around a submerged cylinder and marine hydrokinetic (MHK) device in live-bed conditions *M. Beninati, M. Volpe, M. Krane, A. Fontaine*	
A14. Experimental Techniques I: PIV Algorithms Room: 302 Chair: K. Christensen, U. of Illinois at Urbana-Champaign	**A14.07** Quantifying large-scale flow structures in the wake of a 2.5 MW wind turbine using natural snowfall *J. Hong, M. Toloui, S. Riley, M. Guala, K. Howard, L. Chamorro, J. Tucker, F. Sotiropoulos*			
A16. Biofluids: Physiological I - Computational Studies in Cardiovascular Flows Room: 304 Chair: M. Bukac, U. of Pittsburgh	**A16.07** Pulsatile flow through idealized trabeculae *N. Battista, L. Miller*	**A16.08** Influence of the heart rate and atrioventricular delays on vortex evolution and blood transport inside the left ventricle *S. Hendabadi, P. Martinez-Legazpi, Y. Benito, J. Bermejo, J. del Alamo, S. Shadden*	**A16.09** Hemodynamic consequences of LPA stenosis in single ventricle stage 2 LPN circulation with automatic registration *D. Schiavazzi, E. Kung, A. Dorfman, T. Hsia, A. Baretta, G. Arbia, A. Marsden*	
A17. Biofluids: Locomotion I - Swimming and Flapping Room: 305 Chair: M. Plesniak, George Washington U.	**A17.07** Volumetric PIV Behind a Flapping Wing in an Incoming Vortex Flow *O. Curet, C. Finkel, K. von Ellenrieder, D. Bissell*	**A17.08** Modeling and Navigation of Artificial Helical Swimmers in Channels *F. Temel, A. Acemoglu, S. Yesilyurt*	**A17.09** Forward and backward motion of artificial helical swimmers in cylindrical channels *A. Acemoglu, F. Temel, S. Yesilyurt*	
A18. Biofluids: General I - Vesicle Modeling and Simulations Room: 306/307 Chair: S. Mendez, Centre national de la recherche scientifique (CNRS)	**A18.07** Equilibrium electrodeformation of a vesicle in an ac electric field *Y. Young, H. Nganguia*	**A18.08** Electrohydrodynamics of Three-Dimensional Vesicles *E. Kolahdouz, D. Salac*	**A18.09** Deformation of biomimetic membranes under electroporation using DC electric pulses *P. Salipante, P. Vlahovska*	
A19. Turbulence Modeling I Room: 310/311 Chair: N. Ansari, U. of Pittsburgh				

Sunday Morning, 24 November 2013				
Session	**09:18**	**09:31**	**09:44**	**9:57**
A20. Boundary Layers II: Structure Room: 315 Chair: M. Malik, NASA Langley	**A20.07** Temporal evolution of Townsend's attached eddies *A. Lozano-Duran, J. Jimenez*	**A20.08** Homage to Bob Brodkey at 85: ejections, sweeps and the genesis and extensions of quadrant analysis *J. Wallace*	**A20.09** Probability density function of pressure in turbulent boundary layers *Y. Tsuji, Y. Yamamoto*	**Refreshment Break**, 9:57–10:25 Exhibit Hall A
A21. Turbulence: Simulations I - LES Application Room: 316 Chair: J. Larsson, U. of Maryland	**A21.07** LES study of vortical structures and suction peaks on a 3D square cylinder in turbulent boundary layer *T. Tamura, Y. Ono*	**A21.08** Turbulent Heat Transfer in Curved Pipe Flow *C. Kang, K. Yang*	**A21.09** Secondary Peak in Nusselt Number for Jet Impinging Flows: LES Study *R. Dutta, A. Dewan, B. Srinivasan*	
A22. Turbulence Modeling II Room: 317 Chair: R. Metcalfe, U. of Houston				
A23. Turbulence: Theory I - General Room: 318 Chair: A. Attili, King Abdullah U. of Science and Technology	**A23.07** Turbulent scaling laws as solutions of the multi-point correlation equation using statistical symmetries *M. Oberlack, A. Rosteck, V. Avsarkisov*	**A23.08** Comparing nearly singular vorticity moments in Euler and Navier-Stokes numerical solutions *R. Kerr*	**A23.09** Detrended Structure-Function in Fully Developed Turbulence *Y. Huang*	
A24. Acoustics I Room: 319 Chair: D. Bodony, U. of Illinois at Urbana-Champaign	**A24.07** Acoustic Radiation Force on a Finite-Sized Particle due to an Acoustic Field in a Viscous Compressible Fluid *S. Annamalai, M. Parmar, B. S.*	**A24.08** Sequencing of acoustic events in the near field of subsonic jets *J. Lewalle, P. Kan*	**A24.09** Full-scale simulation and reduced-order modeling of a thermoacoustic engine *C. Scalo, J. Lin, S. Lele, L. Hesselink*	
A25. Flow Control I: Coherent Structures and Vortices Room: 320 Chair: S. Schmitz, Pennsylvania State U.	**A25.07** Suppressing vortex shedding behind a circular cylinder via a tangential standing wave *N. Liu, X. Lu*	**A25.08** Spanwise correlation in the wake of circular cylinder and normal plate placed inside a pipe *A. Agrawal, A. Venugopal, S. Prabhu*	**A25.09** Experimental Investigation of a Helicopter Rotor Hub Wake *D. Reich, B. Elbing, S. Schmitz*	
A26. Reacting Flows I: Detonation Room: 321 Chair: J. Philip Drummond, NASA Langley	**A26.07** Nonlinear evolution equation for 1-D pulsating detonations with Fickett's model for reactive compressible flow, Influence of χ *A. Bellerive, J. Tang, M. Radulescu*	**A26.08** On the role of unreacted pockets in unstable detonation waves *J. Regele*	**A26.09** A qualitative model for detonation with losses *A. Kasimov, L. Faria*	
A28. Free-Surface Flows I Room: Spirit of Pittsburgh Ballroom B/C Chair: J. Crockett, Bringham Young U.	**A28.07** Linear and weakly nonlinear analysis of the rotating polygon instability *J. Mougel, D. Fabre, T. Bohr*	**A28.08** Meniscus Stability in Rotating Systems *Y. Reichel, M. Dreyer*	**A28.09** Hydraulic jumps and contact lines formed by jet impact on an incline *L. Limat, A. Duchesne, R. Herbaut, L. Lebon*	
A30. Instability: Richtmyer-Meshkov Room: 408 Chair: D. Ranjan, Texas A&M U.	**A30.07** Dependence of Single-Interface Richtmyer-Meshkov Mixing on Mach Number using Simultaneous PIV and PLIF Measurements *B. Wilson, R. Mejia-Alvarez, K. Prestridge*	**A30.08** Simultaneous PIV/PLIF measurements of Richtmyer-Meshkov Instabilities from single- and multi-mode perturbed interfaces *R. Mejia-Alvarez, B. Wilson, K. Prestridge*	**A30.09** Simultaneous Concentration and Velocity Field Measurements in a Shock-accelerated Mixing Layer *D. Reese, J. Oakley, C. Weber, D. Rothamer, J. Navarro, R. Bonazza*	

Sunday Morning, 24 November 2013				
Session	**09:18**	**09:31**	**09:44**	**9:57**
A31. Porous Media Flows I - General Room: 402 Chair: D. Lester, CSIRO	**A31.07** Numerical Study of Usage Efficiency of Multistage Filters on Mineral Leaching Process *M. Inkarbekov, A. Kuljabekov, K. Alibayeva, A. Kaltayev*	**A31.08** Dynamics of non- Newtonian fluid flow in porous media *S. Parsa , H. Chiang, S. Datta, D. Weitz*		**Refreshment Break**, 9:57–10:25 Exhibit Hall A
A32. Surface Tension Effects I: Particles and Structure at the Interface Room: 403 Chair: S. Wereley, Purdue U.	**A32.07** Particle shedding from coated magnetic microbubbles *C. Chan, Y. Gao, C. Xu, M. Arora, C. Ohl*	**A32.08** Visualization and minimization of clustering of micro-pillars and walls due to liquid film evaporation *T. Kim, J. Kim, H. Kim*		
A33. Drops I: Pinch-off and Coalescence Room: 404 Chair: J. Gordill, Universidad de Sevilla	**A33.07** Inducing coalescence by a superposition of two Rayleigh-Plateau instabilities: Experimental implementation *P. Sleutel, T. Driessen, R. Jeurissen, F. Dijksman, D. Lohse*	**A33.08** Multiscale computations of thin films between colliding drops *B. Aboulhasanzadeh, S. Dabiri, G. Tryggvason*	**A33.09** Transition from partial to complete coalescence *B. Ray, T. Lee*	
A34. Drops II: Drop Impact on Liquid Surfaces Room: 405 Chair: Y. Lian, Louisville U.	**A34.07** Droplet splashing on a wet moving wall *J. Lou, M. Cheng*	**A34.08** Droplets motion by Dissipative particle dynamics on inclined flat plate with oil film covered *C. Lan, Y. Ma*	**A34.09** Can consecutive droplet deposition yield uniform liquid films? *A. Juel, A. Thompson, C. Tipton, A. Hazel, M. Dowling*	
A35. Suspensions I: Structure and Phase Transitions Room: 406 Chair: A. Colin, Universite de Bordeaux	**A35.07** Analogy between strain-stiffening and jamming in dense flows *G. Düring, E. Lerner, M. Wyart*	**A35.08** Age coarsening of colloidal gels: a micro-mechanical study *R. Zia, B. Landrum, W. Russel*		
A36. Geophysical: Oceanographic I Room: 407 Chair: P. Diamessis, Cornell U.	**A36.07** Simultaneous experimental measurements of velocity and density in solitary internal waves with trapped cores *P. Luzzatto-Fegiz, K. Helfrich*	**A36.08** Effect of External Turbulence on the Evolution of a Towed Wake in a Stratified Environment *A. Pal, S. Sarkar*	**A36.09** Drag Coefficients of Drifting Waterbirds *K. von Ellenrieder, K. Kenow, H. Qu, T. Su*	

Sunday, 24 November 2013

Session B27.01: Awards Presentation, followed by the Otto Laporte Lecture and Corrsin Award Lecture
10:25 – 10:50, Spirit of Pittsburgh Ballroom
Chair: Neelesh Patankar Northwestern University, Gretar Tryggvason, University of Notre Dame
Introduction

Session B27.02: Otto Laporte Lecture
10:50 – 11:35, Spirit of Pittsburgh Ballroom
Chair: Neelesh Patankar Northwestern University, Gretar Tryggvason, University of Notre Dame
Fluid Dynamics Prize: The Reactive Flow Of Ideas Elaine Oran, University of Maryland and Emeritus, US Naval Research Laboratory

Session B27.03: Stanley Corrsin Award Lecture
11:35 – 12:20, Spirit of Pittsburgh Ballroom
Chair: Neelesh Patankar Northwestern University, Gretar Tryggvason, University of Notre Dame
Fluid Mechanics Of Fungi And Slime Michael Brenner, Harvard University

Lunch Break, 12:20 – 13:35

Invited Session C27
13:35 – 14:10, Spirit of Pittsburgh Ballroom A
Chair: James M. Wallace, University of Maryland
Roughness Effects On Wall-Bounded Turbulent Flows Karen Flack, United States Naval Academy

Invited Session C28
13:35 – 14:10, Spirit of Pittsburgh Ballroom B/C
Chair: Howard A. Stone, Princeton University
Microfluidic Flows Of Complex Suspensions: From Flexible Polymers To Swimming Bacteria Anke Lindner, PMMH-ESPCI

Mini Break, 14:10 – 14:15

Sunday Afternoon, 24 November 2013						
Session	**14:15**	**14:28**	**14:41**	**14:54**	**15:07**	**15:20**
D1. Geophysical: Atmospheric II Room: 323 Chair: M. Guala, U. of Minnesota	**D1.01** Influence of inflow condition on wind turbine operation and wake unsteadiness *K. Howard, L. Chamorro, M. Guala*	**D1.02** Stratificaiton Effects on wake of large wind turbines in wind farm *K. Bhaganagar, M. Debnath*	**D1.03** Wind Tunnel Simulation of the Atmospheric Boundary Layer *T. Hohman, A. Smits, L. Martinelli*	**D1.04** Experimental investigations of a sphere anemometer: Wind tunnel and field tests *H. Heisselmann, J. Peinke, M. Hoelling*	**D1.05** MATERHORN Field Campaigns: An Overview *H. Fernando, E. Pardyjak*	**D1.06** Slope and Valley Flow Interactions in MATERHORN-1 *C. Hocut, R. Dimitrova, Z. Silver, S. Di Sabatino, L. Leo, S. Hoch, Y. Wang, E. Pardyjak, H. Fernando*
D2. Convection and Buoyancy-Driven Flows II: Heat Transfer Room: 324 Chair: D. Maynes, Brigham Young U.	**D2.01** Optimal aspect-ratio for heat transport in turbulent Rayleigh-Bénard convection in Cartesian geometry *K. Chong, M. Kaczorowski, K. Xia*	**D2.02** Flow characteristics and heat transfer in wavy walled channels *Z. Mills, T. Shah, V. Monts, A. Warey, S. Balestrino, A. Alexeev*	**D2.03** Heat transfer and stability of horizontal convection with a moving forcing boundary *G. Sheard, T. Tsai, W. Hussam, K. Wong, M. King*	**D2.04** Local Wall Heat Flux *R. Kaiser, R. du Puits*	**D2.05** Optically induced natural convection in a cylinder using conducting metal oxide films *B. Roxworthy, K. Toussaint, S. Vanka*	**D2.06** Wall to Wall Optimal Transport *G. Chini, P. Hassanzadeh, C. Doering*
D3. Multiphase Flows II Room: 325 Chair: J. R. Saylor, Clemson U.	**D3.01** Surface wetting effects on drop passage through a confining orifice *A. Bordoloi, E. Longmire*	**D3.02** Simulations of Three-dimensional Droplet Deformation in a Square-Duct at Moderate Reynolds numbers *J. Horwitz, P. Kumar, P. Vanka*	**D3.03** A Three-dimensional Numerical Study of Immiscible Droplet Deformation in a right angle bend *P. Kumar, J. Horwitz, S. Vanka*	**D3.04** Breakup of an oil slick mixed with dispersants by breaking wave *C. Li, A. Holser, J. Katz*	**D3.05** Inkjet Printer Drop Impact on Coated and Uncoated Papers *S. Hosseini, R. Orsi Koga, N. Ashgriz, S. Chandra*	**D3.06** Tribonucleation of bubbles *S. Wildeman, H. Lhuissier, C. Sun, A. Prosperetti, D. Lohse*
D4. DFD Minisymposium: Nanobubbles Room: 326 Chair: D. Lohse, U. of Twente	**D4.01** Experimental Studies of Nanobubbles at Solid-Water Interfaces *X. Zhang*		**D4.02** Dynamic equilibrium explanation for nanobubbles unusual temperature and saturation dependence *L. Leal*		**D4.03** A new theory of bubble stability: Implications for nanobubbles at surfaces and in bulk solution *V. Craig*	
D5. CFD II: LES I Room: 327 Chair: S. Singh, Carnegie Mellon U.	**D5.01** Direct Simulations of Breaking Ocean Waves with Data Assimilation *J. Rottman, D. Dommermuth, L. Rhymes*	**D5.02** Large-eddy simulation of boundary layer flow on a non-uniform grid using explicit filtering and reconstruction *L. Goodfriend, F. Katopodes Chow, M. Vanella, E. Balaras*	**D5.03** Large Eddy Simulations of Turbulent Reacting Flows in an Opposed-Piston Two Stroke Engine *S. Srivastava, H. Schock, F. Jaberi*	**D5.04** Scalable FDF Simulation of Reacting Flows *P. Pisciuneri, S. Yilmaz, P. Strakey, M. Nik, P. Givi*	**D5.05** Evaluation of the Partially-Averaged Navier-Stokes method for high Mach flows *B. Basara*	**D5.06** Large-eddy simulations of impinging jets at high Reynolds numbers *W. Wu, U. Piomelli*
D6. Microfluids: Flow in Microchannels Room: 328 Chair: S. Claire Hur, Harvard U.	**D6.01** Brownian Dynamics without Green's Functions *A. Donev*	**D6.02** Measuring the thermal diffusion coefficients of artificial and biological particles in a microfluidic chip *C. Zhao, A. Oztekin, X. Cheng*	**D6.03** The clogging cascade of an array of microchannels *E. Barney, E. Dressaire, H. Stone*	**D6.04** Dissipative particle dynamics modeling of blood flow in arterial bifurcations *X. Li, K. Lykov, I. Pivkin, G. Karniadakis*	**D6.05** Identification of viscous droplets' physical properties that determine droplet behaviors in inertial microfluidics *S. Hur*	**D6.06** Forces on near-wall dielectric microparticles in combined electroosmotic and Poiseuille flow through microchannels *M. Yoda, N. Cevheri*
D7. Microfluids: Oscillation Room: 329 Chair: S. Hilgenfeldt, U. of Illinois	**D7.01** Probing the rheology of viscous fluids using microcantilevers and the fluctuation-dissipation theorem *B. Robbins, M. Radiom, J. Walz, W. Ducker, M. Paul*	**D7.02** Controlled microparticle transport in arrays of oscillating probes *K. Chong, J. Eldredge*	**D7.03** Streaming driven by sessile microbubbles: Explaining flow patterns and frequency response *B. Rallabandi, C. Wang, L. Guo, S. Hilgenfeldt*	**D7.04** Calibration of the Modal Parameters of a Microcantilever from Gas Dissipation *C. Lissandrello, K. Ekinci*	**D7.05** Flow induced vibrations of high-frequency microcantilevers *T. Kouh, S. Hodson, V. Yakhot, K. Ekinci*	**D7.06** Analysis of flow characteristics for viscosity sensing applications of suspended microchannel resonators *W. Lee, J. Lee, S. Kang*
D8. Particle-Laden Flows II: Experimental Studies Room: 330 Chair: F. Shaffer, Albany Research Center	**D8.01** DNS of Oscillatory Boundary Layer Over a Closely Packed Layer of Sediment Particles *C. Ghodke, J. Skitka, S. Apte*	**D8.02** 4-Frame Particle Tracking Based on PIV to Study Inertial Particle Relative Motion in Isotropic Turbulence *L. Cao, Z. Dou, Z. Pecenak, F. Yang, Z. Liang, H. Meng*	**D8.03** Simultaneous measurements of velocity gradients and rod rotation in 3D turbulence *S. Kramel, R. Ni, G. Voth, N. Ouellette*	**D8.04** Dynamics of Transported Finite-Sized Particles in Fluid Flows *S. Wang, G. Metcalfe, R. Stewart, J. Wu*	**D8.05** Interfacial deflection and jetting of a paramagnetic particle-laden fluid *I. Griffiths, S. Tsai, Z. Li, P. Kim, H. Stone*	**D8.06** An experimental investigation of the settling and resuspension of gravity-driven, mono- and bi-disperse slurries *G. Urdaneta, M. Hin, K. Huang, S. Kumar, A. Mavromoustaki, J. Wong, S. Lee, A. Bertozzi*
D9. Instability: Interfacial and Thin-Film II Room: 333 Chair: D. Papageorgiou, Imperial College London	**D9.01** Influence of surfactant concentration on satellite formation from the rupture of viscous liquid filaments *E. Nowak, M. Simmons, R. Craster, O. Matar*	**D9.02** Surfactant-driven dynamics of immiscible jets under microfluidic confinement *J. Cabral, J. Yang, O. Matar*	**D9.03** The influence of evaporation on instabilities of liquid layer with insoluble surfactant *A. Mikishev, A. Nepomnyashchy*	**D9.04** The stabilizing mechanism of surfactants in falling films *V. Bontozoglou, G. Karapetsas*	**D9.05** Nonlinear phenomena in two-fluid shear flows in the presence of surfactants *A. Kalogirou, D. Papageorgiou*	**D9.06** Numerical Study of a Hydrodynamic Instability Driven by Evaporation *S. Hernandez-Zapata, J. Romo-Cruz, E. Lopez-Sanchez, G. Ruiz-Chavarria*

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D10. Geophysical: Oceanographic II Room: 334 Chair: S. Sarkar, U. of California, San Diego	**D10.01** Dynamics of SQG Vortices and Passive Scalar Transport *C. Keppel, S. Llewellyn Smith*	**D10.02** An efficient coarse grid projection method for quasigeostrophic models of large-scale ocean circulation *A. Staples, O. San*	**D10.03** Nonlinear Scale Interactions and Energy Pathways in the Ocean *H. Aluie, M. Hecht, G. Vallis*	**D10.04** Exploring the dynamics of turbulence suppression due to dispersed phase in various geophysical flows *M. Shringarpure, M. Cantero, T. Hsu, B. S.*	**D10.05** LES of full-depth Langmuir circulation in a crosswind tidal current *A. Tejada-Martinez, N. Sinha, C. Grosch, G. Martinat*	**D10.06** A K-profile parameterization of Langmuir turbulence in shallow water *N. Sinha, A. Tejada-Martinez, C. Grosch, G. Martinat*
D11. Bubbles II: Cavitation, Acoustics and Biomedical Room: 335 Chair: S. L. Ceccio, U. of Michigan	**D11.01** Original flocculation technique via acoustic cavitation bubbles driven by 20.3-kHz ultrasound in water *Y. Mizushima, T. Saito*	**D11.02** On the behavior of a bubble cloud under an ultrasound field *A. Medina-Palomo, E. Igualada-Villodre, J. Rodriguez-Rodriguez*	**D11.03** Three-dimensional features on oscillating microbubbles streaming flows *M. Rossi, A. Marin, C. Wang, S. Hilgenfeldt, C. Kähler*	**D11.04** Shear Stress induced Stretching of Red Blood Cells by Oscillating Bubbles within a Narrow Gap *F. Li, M. Mohammadzadeh, C. Ohl*	**D11.05** Using ultrasound to steer ultrasound contrast agents: Implications for targeted drug delivery *A. Clark, A. Aliseda*	**D11.06** Analytical and experimental analyses of the translation of microbubbles under short acoustic pulses *E. Igualada-Villodre, A. Medina-Palomo, J. Rodriguez-Rodriguez*
D12. Vortex Dynamics and Vortex Flows II Room: 336 Chair: L. Sigurdson, U. of Alberta	**D12.01** Vortex rings impinging on porous boundaries *S. Dalziel, A. Mujal Colilles*	**D12.02** Interaction of Vortex Rings and Steady Jets with Permeable Screens of Varied Porosity *M. Musta*	**D12.03** Simulation of the Initial 3-D Instability of an Impacting Drop Vortex Ring *L. Sigurdson, J. Wiwchar, J. Walther*	**D12.04** Amplification of Vorticity Near the Stagnation Point of Landing Gear Wheels *G. Feltham, A. Ekmekci*	**D12.05** Large eddy simulation of a vortex ring impinging on a bump *X. Lu, H. Ren*	**D12.06** Interaction of a Vortex Ring Parallel to a Plane Wall *M. Albrecht, D. Bohl*
D13. Focus Session: Marine Hydrokinetic Energy Conversion II Room: 301 Chair: M. Wosnik, U. of New Hampshire	**D13.01** Real-time Ocean Wave Prediction for Optimal Performance of a Wave Energy Converter *D. Cavaglieri, T. Bewley*	**D13.02** Model Scaling of Hydrokinetic Ocean Renewable Energy Systems *K. von Ellenrieder, W. Valentine*	**D13.03** Wave energy harvesting by piezoelectric flexible plates *K. Shoele*	**D13.04** Effect of flow rate and concentration difference on reverse electrodialysis system *K. Kwon, J. Han, D. Kim*	**D13.05** Investigation of Energy Harvesting Using Flapping Foils *A. Mivehchi, A. Persichetti, B. Dunham, J. Dahl*	**D13.06** The Impact of Blade Roughness and Biofouling on the Performance of a Horizontal Axis Marine Current Turbine *K. Flack, J. Walker, M. Schultz, E. Lust*
D14. Experimental Techniques II: Aerodynamics/Wind Tunnel Room: 302 Chair: T. Corke, U. of Notre Dame	**D14.01** Flow measurements on a low speed wind tunnel *D. Garcia, R. Martinez*	**D14.02** Fast response temperature and humidity sensors for measurements in high Reynolds number flows *Y. Fan, G. Arwatz, M. Vallikivi, M. Hultmark*	**D14.03** Dynamic calibration and modeling of a cold wire for temperature measurement *G. Arwatz, C. Bahri, A. Smits, M. Hultmark*	**D14.04** Hot-wire based phase resolved measurement techniques for turbomachinery flows *N. Jaffa, S. Morris, J. Cameron*	**D14.05** Development of a Digital Image Projection (DIP) Technique to Quantify Wind Driven Water Droplet/Rivulet Flows over a NACA 0012 Airfoil *H. Hu, K. Zhang*	**D14.06** Plasma Anemometer Measurements and Optimization *C. Marshall, E. Matlis, T. Corke, S. Gogineni*
D16. Biofluids: Physiological II - Computational Blood Flow in Arteries Room: 304 Chair: P. Zunino, U. of Pittsburgh	**D16.01** Modeling blood flow as a fluid- multilayered structure interaction problem consisting of poroelastic materials *M. Bukac, P. Zunino, I. Yotov*	**D16.02** Toward non-Newtonian effects on secondary flow structures in a 180 degree bent tube model for curved arteries *S. van Wyk, L. Prahl Wittberg, L. Fuchs, K. Bulusu, M. Plesniak*	**D16.03** Hydrodynamic Enhancements of Dissolution from Drug Particles: *In vivo* vs. *In vitro* *J. Brasseur, Y. Wang*	**D16.04** Analysis of perfusion, microcirculation and drug transport in tumors. A computational study. *P. Zunino, L. Cattaneo*	**D16.05** Fractional-order viscoelasticity in one-dimensional blood flow models *P. Perdikaris, G. Karniadakis*	**D16.06** A Porous Media Model for Blood Flow within Reticulated Foam *J. Ortega*
D17. Biofluids: Locomotion II - Swimming Room: 305 Chair: A. Eslampanah, U. of Iowa	**D17.01** Hovering of a jellyfish-like flying machine *L. Ristroph, S. Childress*	**D17.02** Do resonating bells increase jellyfish swimming performance? *A. Hoover, L. Miller*	**D17.03** A Simple Computational Model of a jellyfish-like flying machine *F. Fang, L. Ristroph, M. Shelley*	**D17.04** Ultra-fast Escape of a Octopus-inspired Rocket *G. Weymouth, M. Triantafyllou*	**D17.05** Hydrodynamics of a Digitized Adult Humpback Whale Flipper *W. Fassmann, S. McDonald, S. Thomson, F. Fish*	**D17.06** Effects of leading edge tubercles on the flow over a humpback whale flipper *H. Kim, J. Kim, H. Choi*
D18. Biofluids: General II - Collective Behavior and Microswimmers Room: 306/307 Chair: A. Karimi, U. of Notre Dame	**D18.01** Impact of Viscoelasticity on the Coordinated Swimming of Motile Bacteria *A. Karimi, A. Ardekani*	**D18.02** Diffusion of passive particles in active suspensions *M. Mussler, S. Rafai, T. John, P. Peyla, C. Wagner*	**D18.03** A drag-based mechanism for vertical force production in the smallest flying insects *S. Jones, R. Laurenza, L. Miller*	**D18.04** Emergent structures and dynamics in suspensions of self-phoretic colloids *A. Scagliarini, I. Pagonabarraga*	**D18.05** Hydrodynamics of Choanoflagellate Feeding *A. Andersen, L. Nielsen, T. Kiorboe*	**D18.06** Localized structure of Euglena bioconvection *M. Iima, E. Shoji, A. Awazu, H. Nishimori, S. Izumi*
D19. Biofluids: Cellular I - Computational Studies on Cellular Kinematics Room: 310/311 Chair: T. Wei, U. of Nebraska, Lincoln	**D19.01** Fluid Flow in Cell Printing *M. Jalaal, E. Cheng, A. Ahmadi, K. Cheung, B. Stoeber*	**D19.02** Numerical computations of ionic electrodiffusion and osmotic water flow in cells *L. Yao, Y. Mori*	**D19.03** Numerical Modeling of Flow through Phloem Considering Active Loading *J. Liu, T. Sze, P. Dutta*	**D19.04** The Effect of Shape Memory on Red Blood Cell Motions *X. Niu, L. Shi, T. Pan, R. Glowinski*	**D19.05** Numerical simulation of red blood cell suspensions behind a moving interface in a capillary *S. Zhao, T. Pan*	**D19.06** Probing bilayer–cytoskeletal interactions in erythrocytes using a two-component dissipative particle dynamics model *Z. Peng, X. Li, I. Pivkin, M. Dao, G. Karniadakis*

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D20. Boundary Layers III: Flow over Roughness Elements Room: 315 Chair: L. Castillo, Texas Tech U.	**D20.01** Time Resolved Tomographic PIV Measurements of Rough-Wall Turbulent Channel Flow *R. Miorini, C. Zhang, J. Katz*	**D20.02** The rough-wall turbulent boundary layer revisited *P. Alfredsson, A. Segalini, I. Castro*	**D20.03** Atmospheric boundary layer flow over transverse roughness transitions: induced mixing and flow characterization *D. Willingham, W. Anderson*	**D20.04** Numerical simulations of flow over realistic rough surfaces *J. Yuan, U. Piomelli*	**D20.05** Characteristics of Larger-Scale Motions in Turbulent Flow Overlying Multi-Scale Roughness *J. Barros, K. Christensen*	**D20.06** Investigation of turbulent wedges generated by different single surface roughness elements *D. Traphan, P. Meinlschmidt, O. Lutz, J. Peinke, G. Gülker*
D21. Turbulence: Simulations II - DNS and LES I Room: 316 Chair: K. Mahesh, U. of Minnesota	**D21.01** Towards Feature-Resolved Simulations of Superhydrophobic Surfaces *Y. Li, K. Alame, K. Mahesh*	**D21.02** Direct numerical simulation from laminar to fully-developed turbulence in spatially evolving pipe flow and flat plate boundary layer *X. Wu, P. Moin, R. Adrian, J. Baltzer, J. Hickey*	**D21.03** Application of the High Gradient hydrodynamics code to simulations of a two-dimensional zero-pressure-gradient turbulent boundary layer over a flat plate *B. Kaiser, S. Poroseva, J. Canfield, J. Sauer, R. Linn*	**D21.04** Estimating the Effective Reynolds Number in Implicit Large Eddy Simulation *F. Grinstein, Y. Zhou, A. Wachtor, B. Haines*	**D21.05** Large-Eddy Simulation of Propeller Crashback *P. Kumar, K. Mahesh*	**D21.06** Large Eddy Simulation of Entropy Generation in a Turbulent Mixing Layer *R. Sheikhi, M. Safari, F. Hadi*
D22. Turbulence Modeling III Room: 317 Chair: R. Ranjan, Georgia Institute of Technology	**D22.01** On the accuracy of simulations of a 2D boundary layer with RANS models implemented in OpenFoam *B. Graves, S. Gomez, S. Poroseva*	**D22.02** A hybrid RANS closure scheme for the near-wall turbulence *F. Karimpour, S. Venayagamoorthy*	**D22.03** Application of the order-of-magnitude analysis to a fourth-order RANS closure for simulating a 2D boundary layer *S. Poroseva*	**D22.04** An implicit turbulence model for Preconditioned-Roe scheme by using Truncated Navier-Stokes Equations *C. Li, M. Tsubokura*	**D22.05** Optimal Turbulence Closures in Galerkin Models *B. Protas, B. Noack*	**D22.06** A three-equation bypass transition model based on the intermittency function *X. Ge, P. Durbin*
D23. Turbulence: Theory II - General Room: 318 Chair: S. Girimaji, Texas A&M U.	**D23.01** Effects of anisotropy on the fluctuating dissipation scale *I. May, L. Dasi*	**D23.02** Local dissipation scales in turbulent shear flows *P. Hamlington*	**D23.03** Nonlocal pressure and viscous contributions to the velocity gradient statistics based on Gaussian random fields *M. Wilczek, C. Meneveau*	**D23.04** Exploring the link between intermittency in scalar dissipation (χ) and energy dissipation (ε) rates *S. Verma, G. Blanquart*	**D23.05** More on the asymptotic state of high Reynolds number, smooth-wall turbulent flows *D. Pullin, A. Leonard*	**D23.06** Turbulent Relative Particle Dispersion: Brownian Motion Theory *B. Shivamoggi*
D24. Acoustics II Room: 319 Chair: W. Baars, U. of Melbourne	**D24.01** Acoustophoretic contactless transport and handling of matter *D. Foresti, M. Nabavi, M. Klingauf, A. Ferrari, D. Poulikakos*	**D24.02** Aeroacoustic sound radiated from a flow past an oscillating and a fixed cylinder in tandem *Y. Hattori, R. Komatsu*	**D24.03** Adjoint-field errors in high fidelity compressible turbulence simulations for sound control *R. Vishnampet, D. Bodony, J. Freund*	**D24.04** Dynamic Mode Decomposition of a Supersonic Jet Exhausting a Convergent-Divergent Nozzle *B. Semlitsch, M. Mihaescu, L. Fuchs*	**D24.05** Comparison and Properties of Near-Field and Far-Field Events of High Speed Jet *P. Kan, J. Lewalle*	**D24.06** Supersonic Jet Noise Reduction Using Microjets *E. Gutmark, D. Cuppoletti, B. Malla*
D25. Flow Control II: Jets Room: 320 Chair: W. Huebsch, West Virginia U.	**D25.01** Performance Enhancement of a Vertical Tail Using Synthetic Jet Actuators: Flow Physics *N. Rathay, E. Whalen, M. Amitay*	**D25.02** Interactions of a finite span synthetic jet with a cross flow *C. Leong, T. Van Buren, E. Whalen, M. Amitay*	**D25.03** Numerical Investigation of Synthetic-jet based Flow Control on Vertical-axis Wind Turbine Blades *A. Menon, S. Tran, O. Sahni*	**D25.04** Active Flow Control Integrated Diffuser for increased Energy Efficiency in Variable Air Volume Systems *H. Van Der Schijff, D. Menicovich, J. Vollen, M. Amitay*	**D25.05** Open loop control of an axisymmetric turbulent wake using pulsed jet blowing *J. Morrison, A. Oxlade*	**D25.06** Flow Interactions of a Finite-span Synthetic Jet near a Wing Tip *J. Vasile, M. Amitay*
D26. Reacting Flows II: DNS/LES/RANS Room: 321 Chair: R. Miller, Clemson U.	**D26.01** Subgrid-scale mixing of temperature perturbations from flamelet in turbulent partially premixed flames *S. Liu, C. Tong*	**D26.02** Analysis of Subgrid-Scale Backscatter in Turbulent Reacting Flows *J. O'Brien, J. Urzay, M. Ihme, P. Moin, A. Saghafian*	**D26.03** A Moments-Based Method for Turbulent Combustion Based on Principal Components: A priori and a posteriori validation *H. Mirgolbabaei, T. Echekki*	**D26.04** Modeling of Unsteady Heat Transfer in Flame-Wall Interaction *H. Wu, M. Ihme*	**D26.05** Unsteady effects on Polycyclic Aromatic Hydrocarbons in a turbulent jet flame *Y. Xuan, G. Blanquart*	**D26.06** Large Eddy Simulation of ignition in an annular multi-injector combustor *R. Vicquelin, M. Philip, M. Boileau, T. Schmitt, J. Bourgoin, D. Durox, S. Candel*
D27. Transonic and Turbomachinery CFD Room: Spirit of Pittsburgh Ballroom A Chair: S. Morris, U. of Notre Dame	**D27.01** Transonic Flows of Bethe-Zel'dovich-Thompson Fluids *M. Cramer, A. Andreyev*	**D27.02** Supersonic flows of a BZT fluid over thin airfoils *F. Bahmani, M. Cramer*	**D27.03** Entropy Generation in Three-dimensional, Swirling Flows *S. Morris, E. Perez, J. Cameron, A. Jemcov*	**D27.04** The Impact of Casing Geometry on a High Speed Compressor Rotor Passage Shock *M. Ross, H. Chen, J. Cameron, S. Morris*	**D27.05** Global stability analysis of a transonic flow over OAT15A airfoil *F. Sartor, C. Mettot, D. Sipp*	**D27.06** Mach number effects on compressible flow past a circular cylinder at high Reynolds number *Z. Xia, Y. Shi, Z. Xiao, S. Chen*
D28. Free-Surface Flows II Room: Spirit of Pittsburgh Ballroom B/C Chair: E. Rame, National Center for Space Exploration	**D28.01** Free surface shapes in rigid body rotation *E. Rame, R. Balasubramaniam*	**D28.02** The Interaction of a Turbulent Ship-Hull Boundary Layer and a Free Surface *N. Masnadi, N. Washuta, A. Wang, J. Duncan*	**D28.03** The effect of bed roughness on the free surface of an open channel flow and implications for remotely monitoring river discharge *E. Johnson, E. Cowen*	**D28.04** Rivulet between two planes: effect of inlet angle *P. Vorobieff, N. Fathi*	**D28.05** Flow around the corner in the water impact problem *R. Krechetnikov*	**D28.06** Oblique impact of dense granular sheets *J. Ellowitz, N. Guttenberg, H. Jaeger, S. Nagel, W. Zhang*

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D30. Porous Media Flows II: Mixing and Turbulence Room: 408 Chair: J. Liburdy, Oregon State U.	**D30.01** Stretching, Coalescence and Mixing in Porous Media *T. Le Borgne, M. Dentz, E. Villermaux*	**D30.02** Solute Blob Evolution and Mixing Dynamics in a Darcy Scale Heterogeneous Porous Medium *M. Dentz, T. Le Borgne, F. de Barros*	**D30.03** Scale Estimation for Turbulent Flows in Porous Media *V. Patil, J. Liburdy*	**D30.04** Direct Numerical Simulation of a turbulent channel flow over Slippery Liquid-Infused Porous Surfaces *I. Arenas, P. Orlandi, S. Leonardi*	**D30.05** Dynamics of temporally-evolving shear layers on the interface between a porous medium and a pure fluid *P. Antoniadis, M. Papalexandris*	
D31. Porous Media Flows III: Wicking, Drying and Displacement of Immiscible Fluids Room: 402 Chair: D. Anderson, George Mason U.	**D31.01** Asymmetric Wicking and Reduced Evaporation Time of Droplets Penetrating a Thin Double-Layered Porous Material *A. Vahdani, A. Gat, A. Nowakowski, H. Navaz, M. Gharib*	**D31.02** How books are wet by water *J. Kim, H. Kim*	**D31.03** Experiments versus modeling of buoyant drying of porous media *D. Salin, A. Yiotis, E. Tajer, Y. Yortsos*	**D31.04** Homogenization Approaches for Draining in Layered Porous Media *D. Anderson*	**D31.05** Influence of heterogeneity on second-kind self-similar solutions for gravity currents *Z. Zheng, I. Christov, H. Stone*	**D31.06** Pulsed-pressure driven displacement of a non-Newtonian fluid in a radial Hele-Shaw cell *C. Pereira, A. White, T. Ward*
D32. Surface Tension Effects II: Interfacial Flows Room: 403 Chair: K. Daniels, North Carolina State U.	**D32.01** The Elasto-capillary Landau-Levich Problem *G. Homsy, H. Dixit*	**D32.02** Capillarity-Driven Bubble Separations *A. Wollman, M. Weislogel, M. Dreyer*	**D32.03** Inertial and Washburn Regimes in Filling of Charged Capillaries *S. Das, S. Mitra, J. Eijkel, N. Tas, S. Chakraborty*	**D32.04** Impact on Floating Membranes *N. Vandenberghe, L. Duchemin*	**D32.05** Marangoni forces in interfacial dilatational rheology *G. Elfring, G. Leal, T. Squires*	**D32.06** The influence of a soluble surfactant on the deformation and retraction of a viscous drop *A. Gonzalez-Mancera, J. Cepeda, D. Luna*
D33. Drops III: Electric Field Effects Room: 404 Chair: A. Khair, Carnegie Mellon U.	**D33.01** Electrohydrodynamic interactions in Quincke rotation: from pair dynamics to collective motion *D. Das, D. Saintillan*	**D33.02** Electrorotation of a viscous droplet in a uniform direct current electric field *H. He, P. Salipante, P. Vlahovska*	**D33.03** The Influence of Inertia and Charge Relaxation on Electrohydrodynamic Drop Deformation *J. Lanauze, L. Walker, A. Khair*	**D33.04** Deformation of leaky-dielectric fluid globules under strong electric fields: Boundary layers and jets at large Reynolds numbers *O. Schnitzer, I. Frankel, E. Yariv*	**D33.05** Retreating behavior of a charged ionic liquid droplet in a dielectric liquid under electric field *M. Ahn, D. Im, I. Kang*	**D33.06** A numerical method for electro-kinetic flow with deformable fluid interfaces *M. Booty, M. Ma, M. Siegel*
D34. Drops IV: Particle-Laden Drops Room: 405 Chair: V. Adumitroaie	**D34.01** Impact of particle laden drops onto surfaces of various wettability *V. Grishaev, C. Iorio, A. Amirfazli*	**D34.02** Yield stress fluid droplet impact on coated surfaces *B. Blackwell, M. Deetjen, R. Ewoldt*	**D34.03** Monolayer Splat *W. Zhang, L. Lubbers, Q. Xu, S. Wilken, H. Jaeger*	**D34.04** Splashing onset in dense suspension droplets *I. Peters, M. Klein Schaarsberg, Q. Xu, H. Jaeger*	**D34.05** Dense suspension splash *K. Dodge, I. Peters, J. Ellowitz, M. Schaarsberg, H. Jaeger, W. Zhang*	**D34.06** Electrostatic control of the coffee stain effect *A. Wray, D. Papageorgiou, K. Sefiane, O. Matar*
D35. Suspensions II: Fluid-Particle Interactions Room: 406 Chair: M. Wyart, New York U.	**D35.01** On the motion of a neutrally buoyant cylinder in simple shear flow *T. Pan, S. Chen, S. Huang, C. Chu, C. Chang*	**D35.02** Rotation of porous ellipsoids in simple shear flows *H. Masoud, H. Stone, M. Shelley*	**D35.03** Dynamics of a Janus droplet in a linear shear flow *M. Díaz-Maldonado, A. Ivantsov, S. Shklyaev, U. Córdova-Figueroa*	**D35.04** Numerical simulation of Stokes flow around particles via a hybrid Finite Difference-Boundary Integral scheme *A. Bhattacharya*	**D35.05** Shear-Induced Diffusion of Cubic Colloids *S. Hudson, J. Royer, D. Blair*	**D35.06** Shear-induced diffusion of non-Brownian suspensions using a colored noise Fokker-Planck equation *L. Lukassen, M. Oberlack*
D36. Instability: General I Room: 407 Chair: C. Beaume, U. of California, Berkeley	**D36.01** Stability analysis of an impacting T-junction pipe flow *K. Chen, C. Rowley, H. Stone*	**D36.02** Tomographic PIV Observations of the Growth of Localized Perturbations in Transitional Taylor-Couette Flow *D. Borrero, M. Schatz*	**D36.03** Low-drag exact coherent states in Newtonian channel flow *J. Park, M. Graham*	**D36.04** Exact near-wall traveling waves of plane Poiseuille flow *J. Gibson, E. Brand*	**D36.05** A doubly-localized solution of plane Couette flow *E. Brand, J. Gibson*	**D36.06** Linear stability analysis of swirling turbulent flows with turbulence models *V. Gupta, M. Juniper*

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D1. Geophysical: Atmospheric II Room: 323 Chair: M. Guala, U. of Minnesota	**D1.07** Effects of complex terrain on atmospheric flow: dividing streamline observations and quantification *M. Thompson, H. Fernando, S. Di Sabatino, L. Leo*	**D1.08** The critical slope for orographic rain *R. Breidenthal, N. Zagar*	**D1.09** A numerical study of turbulent flow over complex aeolian dune fields: the White Sands National Monument *W. Anderson, M. Chamecki, G. Kocurek, D. Mohrig*	**D1.10** Three-dimensional Quasi-Geostrophic Convection in the Rotating Cylindrical Annulus with Steeply Sloping Endwalls *K. Julien, M. Calkins, P. Marti*	**Refreshment Break**, 16:25–16:45 Exhibit Hall A
D2. Convection and Buoyancy-Driven Flows II: Heat Transfer Room: 324 Chair: D. Maynes, Brigham Young U.	**D2.07** Solution breakdown due to natural convection of the boundary-layer radial flow on a constant temperature horizontal plate *R. Fernandez-Feria, C. del Pino, A. Fernández-Gutiérrez*	**D2.08** Convection to Sessile Droplets on Superhydrophobic Surfaces *D. Maynes, R. Hays, J. Crockett*	**D2.09** Anomalous convective heat transport and rain formation in cryogenic helium *K. Sreenivasan, P. Urban, P. Hanzelka, D. Schmoranzer, L. Skrbek*	**D2.10** An air curtain in the doorway of a ventilated space *D. Frank, P. Linden*	
D3. Multiphase Flows II Room: 325 Chair: J. R. Saylor, Clemson U.	**D3.07** Stability analysis applied to the early stages of viscous drop breakup by a high-speed gas stream *J. Padrino, E. Longmire*	**D3.08** Break-up of droplets in a concentrated emulsion flowing through a narrow constriction *S. Tang, L. Fan, Y. Chen, L. Rosenfeld*	**D3.09** Droplet impact on falling liquid films *O. Matar, Z. Che, I. Zadrazil, G. Hewitt, C. Markides*	**D3.10** Theoretical and numerical investigation of turbulence/interface interactions due to surface tension effects *J. McCaslin, C. Yeh Goh, O. Desjardins*	
D4. DFD Minisymposium: Nanobubbles Room: 326 Chair: D. Lohse, U. of Twente	**D4.04** Surface nanobubbles: Theory, numerics and experiments *J. Weijs*		**D4.05** A theory for metastabilities in bubble nucleation: can it help explaining nanobubbles? *C. Casciola*		
D5. CFD II: LES I Room: 327 Chair: S. Singh, Carnegie Mellon U.	**D5.07** Impact of Model Fidelity on Jet Impingement Simulations *B. Reibman, M. Benson, D. Helmer, G. Rodebaugh*	**D5.08** Simulations of a Normal Shock Train in a Constant Area Duct Using Wall-Modeled LES *Z. Vane, I. Bermejo-Moreno, S. Lele*	**D5.09** CFD predictions of confined turbulent swirling flows in a microscale multi-inlet vortex reactor *M. Olsen, Y. Shi, G. Iaccarino, R. Fox*	**D5.10** Large Eddy Simulation for round jet in cross-flow using Local Mesh Refinement *M. Cevheri, T. Stoesser*	
D6. Microfluids: Flow in Microchannels Room: 328 Chair: S. Claire Hur, Harvard U.	**D6.07** Measurement and characterization of lift forces on drops and bubbles in microchannels *C. Stan, L. Guglielmini, A. Ellerbee, D. Caviezel, G. Whitesides, H. Stone*	**D6.08** Study nanoparticle delivery in microcirculation through a microfluidic device *Y. Liu, A. Thomas, J. Tan*	**D6.09** Viscoelasticity of dilute capsule suspension under Stokes flows *D. Matsunaga, Y. Imai, T. Yamaguchi, T. Ishikawa*	**D6.10** Harnessing Passive Cilia for Surface Cleaning of Microfluidic Devices *A. Tripathi, H. Shum, A. Balazs*	
D7. Microfluids: Oscillation Room: 329 Chair: S. Hilgenfeldt, U. of Illinois	**D7.07** Mode Coupling of phonons in a Dense One-Dimensional Microfluidic Crystal *J. Fleury, U. Schiller, S. Thutupalli, G. Gompper, R. Seemann*	**D7.08** Viscous damping of a periodic perforated microstructure *D. Homentcovschi, B. Murray, R. Miles*	**D7.09** Three-dimensional tracking of acoustophoretic particle trajectories in a Poiseuille flow *R. Barnkob, M. Rossi, A. Marin, C. Kähler*	**D7.10** Shape Morphing of an Elastic Cylinder via Time-Varying Internal Viscous Flows *S. Elbaz, A. Gat*	
D8. Particle-Laden Flows II: Experimental Studies Room: 330 Chair: F. Shaffer, Albany Research Center	**D8.07** Particle-turbulence interaction of suspended load by forced jet impinging jet on a mobile sediment bed *R. Mulinti, K. Corfman, K. Kiger*	**D8.08** Laboratory Study of Homogeneous and Isotropic Turbulence at High Reynolds Number *Z. Pecenak, Z. Dou, F. Yang, L. Cao, Z. Liang, H. Meng*	**D8.09** Bead resuspension and saltation in a turbulent channel flow *R. van Hout*		
D9. Instability: Interfacial and Thin-Film II Room: 333 Chair: D. Papageorgiou, Imperial College London	**D9.07** Long-wave Marangoni convection in a heated liquid layer with insoluble surfactant *M. Morozov, A. Oron, A. Nepomnyashchy*	**D9.08** Completely Stabilizing the Interface in a Rayleigh-Taylor Problem by Heating *R. Narayanan, L. Johns*	**D9.09** Nonlinear dynamics of a binary liquid layer heated from above *A. Nepomnyashchy, S. Shklyaev*	**D9.10** Vibration impact on Marangoni instability in a thin film *S. Shklyaev, A. Alabuzhev, M. Khenner*	

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Session	**15:33**	**15:46**	**15:59**	**16:12**	**16:25**
D10. Geophysical: Oceanographic II Room: 334 Chair: S. Sarkar, U. of California, San Diego	**D10.07** Numerical Simulations of the Reduced Craik–Leibovich Equations in Spatially-Extended Domains *Z. Zhang, G. Chini, K. Julien*	**D10.08** The Craik-Leibovich Vortex Force as a Skin Effect *Z. Malecha, G. Chini, K. Julien*			**Refreshment Break**, 16:25–16:45 Exhibit Hall A
D11. Bubbles II: Cavitation, Acoustics and Biomedical Room: 335 Chair: S. L. Ceccio, U. of Michigan	**D11.07** Shock-Induced Bubble Collapse in a Vessel: Implications for Vascular Injury in Shockwave Lithotripsy *V. Coralic, T. Colonius*	**D11.08** Dynamics of bubble collapse under vessel confinement in 2D hydrodynamic experiments *G. Shpuntova, J. Austin*	**D11.09** Characterization of Acoustic Droplet Vaporization Using MRI *D. Li, S. Allen, L. Hernandez-Garcia, J. Bull*	**D11.10** Acoustic droplet vaporization is initiated by superharmonic focusing *O. Shpak, M. Verweij, R. Vos, N. de Jong, D. Lohse, M. Versluis*	
D12. Vortex Dynamics and Vortex Flows II Room: 336 Chair: L. Sigurdson, U. of Alberta	**D12.07** Numerical study of vorticity-enhanced heat transfer *X. Wang, S. Alben*	**D12.08** Controlling vortex breakdown in swirling pipe flows: experiments and simulations *D. Dennis, C. Seraudie, R. Poole*	**D12.09** Flow instability and vortex street in eccentric annular channels *G. Choueiri, S. Tavoularis*	**D12.10** Stability Analysis of the Vortex Rope Formed in Draft Tubes *G. Rajan, J. Cimbala*	
D13. Focus Session: Marine Hydrokinetic Energy Conversion II Room: 301 Chair: M. Wosnik, U. of New Hampshire	**D13.07** The Influence of depth and surface waves on marine current turbine performance *E. Lust, K. Flack, L. Luznik, M. Van Benthem, J. Walker*	**D13.08** Characterizing Turbulent Events at a Tidal Energy Site from Acoustic Doppler Velocity Observations *K. McCaffrey, B. Fox-Kemper, P. Hamlington*	**D13.09** Experimental Investigation of Effects of Blockage and Free Surface Proximity on Flow-field and Performance of a Hydrokinetic Turbine *N. Kolekar, A. Banerjee*		
D14. Experimental Techniques II: Aerodynamics/Wind Tunnel Room: 302 Chair: T. Corke, U. of Notre Dame	**D14.07** Simultaneous time-resolved measurement of flow field and surface deformation combining tomographic PIV and Mach-Zehnder interferometry *C. Zhang, R. Miorini, J. Katz*	**D14.08** Single Rod Vibration in Axial Flow *N. Weichselbaum, S. Wang, P. Bardet*	**D14.09** Lonely GPFUTV–the movement of water under the action of unknown vacuum *W. Lin*		
D16. Biofluids: Physiological II - Computational Blood Flow in Arteries Room: 304 Chair: P. Zunino, U. of Pittsburgh	**D16.07** Vortex dynamics in ruptured and unruptured intracranial aneurysms *G. Trylesinski, N. Varble, J. Xiang, H. Meng*	**D16.08** Accuracy of Computational Cerebral Aneurysm Hemodynamics Using Patient-Specific Endovascular Measurements *P. McGah, M. Levitt, M. Barbour, P. Mourad, L. Kim, A. Aliseda*	**D16.09** Effects of Aortic Irregularities on the Blood Flow *I. Gutmark-Little, L. Prahl-Wittberg, S. van Wyk, M. Mihaescu, L. Fuchs, P. Backeljauw, E. Gutmark*	**D16.10** A Computational Fluid Dynamic Study of Blood Flow Within the Coiled Umbilical Arteries *D. Wilke, J. Denier, T. Mattner, Y. Khong*	
D17. Biofluids: Locomotion II - Swimming Room: 305 Chair: A. Eslampanah, U. of Iowa	**D17.07** On the efficiency of fins in human swimming *C. Cohen, B. Darbois Texier, D. Quéré, C. Clanet*	**D17.08** Efficiency is designed into free swimming *M. Saadat, H. Haj-Hariri*	**D17.09** Hydrodynamic flows can induce selective advantages among species *F. Tesser, R. Benzi, H. Clercx, D. Nelson, P. Perlekar, F. Toschi*	**D17.10** Mechanism of maximum thrust generation by oscillating compliant caudal-fin model in a quiescent fluid *H. Park, Y. Park, K. Cho, H. Choi*	
D18. Biofluids: General II - Collective Behavior and Microswimmers Room: 306/307 Chair: A. Karimi, U. of Notre Dame	**D18.07** Limit cycle dynamics in swimming systems *C. Finkel, K. von Ellenrieder*	**D18.08** Local fluid transport by planktonic swarms *M. Martinez-Ortiz, J. Dabiri*	**D18.09** Why do mayflies switch from rowing to flapping as they grow? *R. Chabreyrie, K. Abdelaziz, E. Balaras, K. Kiger*	**D18.10** Simulation of collective behaviour in micro-scale swimmers: Effects of tumbling and rotary diffusion *D. Krishnamurthy, G. Subramanian*	
D19. Biofluids: Cellular I - Computational Studies on Cellular Kinematics Room: 310/311 Chair: T. Wei, U. of Nebraska, Lincoln	**D19.07** Quantifying the transition of blood flow to the non-continuum regime *H. Lei, D. Fedosov, B. Caswell, G. Karniadakis*	**D19.08** 2-Point Particle Tracking Microrheology of Directional Gels *M. Gomez-Gonzalez, J. del Alamo*	**D19.09** Ordered and chaotic flow of red blood cells flowing in a narrow tube *N. Beams, J. Freund*	**D19.10** Three-dimensional simulations of the cell growth and cytokinesis using an immersed boundary method *Y. Li, J. Choi*	

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D20. Boundary Layers III: Flow over Roughness Elements Room: 315 Chair: L. Castillo, Texas Tech U.	**D20.07** Parametric analysis of turbulent wall jet in still air over a transitional rough surface: Universal relations *N. Afzal*	**D20.08** Direct numerical simulation of a turbulent rough-walled pipe *A. Ooi, L. Chan, M. MacDonald, N. Hutchins, D. Chung*	**D20.09** Perturbation of turbulent channel flow structure by a cylindrical roughness element *G. Pathikonda, K. Christensen*		**Refreshment Break**, 16:25–16:45 Exhibit Hall A
D21. Turbulence: Simulations II - DNS and LES I Room: 316 Chair: K. Mahesh, U. of Minnesota	**D21.07** Large-eddy simulations of a fully appended submarine model *A. Posa, E. Balaras*	**D21.08** Direct numerical simulations of curvature effects on shear layer transition over airfoils *W. Zhang, W. Cheng, A. Qamar, W. Gao, R. Samtaney*	**D21.09** Direct Numerical Simulation of a Transient Cumulus Flow *P. Prabhakaran, S. Deshpande, R. Narasimha*	**D21.10** Reynolds number effects on drag reduction of turbulent boundary layers subject to wall oscillation *M. Mishra, M. Skote*	
D22. Turbulence Modeling III Room: 317 Chair: R. Ranjan, Georgia Institute of Technology	**D22.07** Use of DNS Data for the Evaluation of Closure Models for Rotating Turbulent Channel Flow *A. Hsieh, S. Biringen, A. Kucala*	**D22.08** Separated shear-layer instability reproduction by a Reynolds stress model of turbulence *S. Jakirlic, R. Maduta*	**D22.09** Experimental verification of turbulence models for pressure diffusion process in plane turbulent jet *O. Terashima, Y. Sakai, K. Nagata, Y. Ito*	**D22.10** An alternative eddy-viscosity representation and its implication to turbulence modeling *S. Jakirlic, J. Jovanovic, B. Basara*	
D23. Turbulence: Theory II - General Room: 318 Chair: S. Girimaji, Texas A&M U.	**D23.07** Why the "K41"/Batcher hypothesis of "local equilibrium" is wrong *W. George*	**D23.08** What are the origins of -5/3 spectra and related dissipation scalings? *S. Laizet, J. Vassilicos*	**D23.09** Axisymmetric turbulent wakes with new non-equilibrium similarity scalings *J. Vassilicos, J. Nedic, B. Ganapathisubramani*	**D23.10** Power Fluctuations and Irreversibility in Turbulence *H. Xu, A. Pumir, G. Falkovich, E. Bodenschatz, M. Shats, H. Xia, N. Francois, G. Boffetta*	
D24. Acoustics II Room: 319 Chair: W. Baars, U. of Melbourne	**D24.07** High fidelity measurements in the far-field of a Mach 3 jet *R. Fiévet, W. Baars, D. Silva, C. Tinney*	**D24.08** Acoustic far-field of shroud-lip-scattered instability modes of supersonic co-flowing jets *A. Samanta, J. Freund*	**D24.09** Jet Crackle: Near-field Nonlinear Acoustic Interactions Due to High-Speed Turbulent Sources *D. Buchta, J. Freund*	**D24.10** Time Reversal Acoustic in a flowing medium *T. Luong, M. Arora, T. Hies, C. Ohl*	
D25. Flow Control II: Jets Room: 320 Chair: W. Huebsch, West Virginia U.	**D25.07** Feedback Control of the Wake of a Three-Dimensional Blunt Bluff Body *T. Flinois, A. Morgans*	**D25.08** Aerodynamic Flow Control of a Moving Axisymmetric Platform *T. Lambert, B. Vukasinovic, A. Glezer*	**D25.09** Supersonic Jet Noise Reduction Using Flapping Injection and Pulsed Injection *H. Hafsteinsson, L. Eriksson, D. Cuppoletti, E. Gutmark*	**D25.10** Drag reduction in a turbulent channel flow using a passivity-based approach *P. Heins, B. Jones, A. Sharma*	
D26. Reacting Flows II: DNS/LES/RANS Room: 321 Chair: R. Miller, Clemson U.	**D26.07** Large-eddy simulations of real-fluid effects in rocket engine combustors *P. Ma, J. Hickey, M. Ihme*	**D26.08** Direct Numerical Simulation Study of Nonequilibrium Effects on Mixing and Combustion in Supersonic Jets *H. Koo, V. Raman, P. Varghese*	**D26.09** Quasi-dual-mode behavior in the combustor of the HyShot scramjet *J. Larsson, R. Vicquelin, J. Bodart, I. Bermejo-Moreno, S. Laurence*	**D26.10** A Priori Analysis of Flamelet-based Modeling for a Dual-Mode Scramjet Combustor *J. Quinlan, J. McDaniel, T. Drozda, G. Lacaze, J. Oefelein*	
D27. Transonic and Turbomachinery CFD Room: Spirit of Pittsburgh Ballroom A Chair: S. Morris, U. of Notre Dame					
D28. Free-Surface Flows II Room: Spirit of Pittsburgh Ballroom B/C Chair: E. Rame, National Center for Space Exploration	**D28.07** Simultaneous Multiphase PIV of Capillary Waves on a High Velocity Liquid Jet *M. Andre, P. Bardet*	**D28.08** Ejecta evolution during cone impact *J. Marston, I. Vakarelski, S. Thoroddsen*	**D28.09** Flow-pattern analysis in open and closed square ducts: A comparative investigation of corner vortices *J. Kriegseis, M. Vaas, B. Frohnapfel*	**D28.10** Water entry without surface seal: extended cavity formation *M. Mansoor, J. Marston, I. Vakarelski, S. Thoroddsen*	

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Session	**15:33**	**15:46**	**15:59**	**16:12**	**16:25**
D30. Porous Media Flows II: Mixing and Turbulence Room: 408 Chair: J. Liburdy, Oregon State U.					**Refreshment Break**, 16:25–16:45 Exhibit Hall A
D31. Porous Media Flows III: Wicking, Drying and Displacement of Immiscible Fluids Room: 402 Chair: D. Anderson, George Mason U.	**D31.07** Immiscible fluids in mixed wet porous media: the role of wettability correlations *J. Murison, B. Semin, J. Baret, S. Herminghaus, M. Schroeter, M. Brinkmann*	**D31.08** A new computational technique for modeling underground reservoirs *A. Arya*	**D31.09** 3d Forced multiphase flow on the pore scale *H. Scholl, K. Singh, M. Scheel, M. DiMichiel, S. Herminghaus, R. Seemann*	**D31.10** Mathematical modeling heat and mass transfer processes in porous media *D. Akhmed-Zaki*	
D32. Surface Tension Effects II: Interfacial Flows Room: 403 Chair: K. Daniels, North Carolina State U.	**D32.07** Surfactant on a Thin Liquid Layer: Outward Spreading *E. Swanson, S. Strickland, M. Shearer, K. Daniels*	**D32.08** Surfactant on a Thin Liquid Layer: Self-Healing Dynamics *S. Strickland, C. Conti, M. Hin, R. Sayanagi, K. Daniels, R. Levy*	**D32.09** On the Measurement of Longitudinal Interfacial Waves and Surfactant Dynamic Properties *N. Washuta, X. Liu, G. Korenowski, J. Duncan*	**D32.10** Marangoni flow induced by alcohol deposition on a water film *F. Hernandez-Sanchez, A. Eddi, J. Snoeijer*	
D33. Drops III: Electric Field Effects Room: 404 Chair: A. Khair, Carnegie Mellon U.	**D33.07** Electrohydrodynamics of drops covered with small particles *M. Ouriemi, P. Vlahovska*	**D33.08** Numerical simulations of a ferrofluid drop on a substrate under an applied magnetic field *I. Seric, S. Afkhami, L. Kondic*	**D33.09** Electrowetting-driven spreading and jumping of drops in oil *J. Hong, S. Lee*	**D33.10** Wetting of sessile water drop under an external electrical field *V. Vancauwenberghe, P. Di Marco, D. Brutin*	
D34. Drops IV: Particle-Laden Drops Room: 405 Chair: V. Adumitroaie	**D34.07** Spontaneous formation of nanostructures inside inkjet-printed colloidal drops *X. Yang, N. Thorne, Y. Sun*	**D34.08** Building micro-soccer-balls with evaporating colloidal fakir drops *H. Gelderblom, ´ Marín, A. Susarrey-Arce, A. van Housselt, L. Lefferts, H. Gardeniers, D. Lohse, J. Snoeijer*	**D34.09** Influence of Relative Humidity on the Spreading Dynamics of a Drying Drop of Whole Blood *W. Bou Zeid, D. Brutin*	**D34.10** Opportunities for Fluid Dynamics Research in the Forensic Discipline of Bloodstain Pattern Analysis *D. Attinger, C. Moore, A. Donaldson, A. Jafari, H. Stone*	
D35. Suspensions II: Fluid-Particle Interactions Room: 406 Chair: M. Wyart, New York U.	**D35.07** Particle drifts in semi-dilute suspensions of highly viscous droplets *H. Bodiguel, F. Schembri, V. Mansard, A. Colin*	**D35.08** Arbitrary Lagrangian-Eulerian simulations of particle and bubble dynamics in non-Newtonian fluids *P. Yue*	**D35.09** Rheological properties of suspensions of bubbles in a yield stress fluid *L. Ducloue, G. Ovarlez, X. Chateau, O. Pitois, J. Goyon*		
D36. Instability: General I Room: 407 Chair: C. Beaume, U. of California, Berkeley	**D36.07** Electrokinetic Instability in Plane Poiseuille Flow *L. Vermach, C. Caulfield*	**D36.08** Increasing lifetimes and the growing saddle of shear flow turbulence *T. Schneider, B. Eckhardt, T. Kreilos*	**D36.09** Flow Instability and Secondary Vortex Evolution in 90 Degree Bend *L. Niu, H. Dou*	**D36.10** Kelvin-Helmholtz instabilities and Bénard Von-Karman Streets under lateral confinement *L. Lebon, P. Boniface, M. Receveur, L. Limat, F. Bouillet*	

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Session	**16:45**	**16:58**	**17:11**	**17:24**	**17:37**	**17:50**
E1. Geophysical: Oceanographic III Room: 323 Chair: E. Paterson, Virginia Polytechnic Institute and State U.	**E1.01** On the study of radar backscattering of ocean surface in response to rainfall *X. Liu, Q. Zheng, R. Liu, J. Duncan*	**E1.02** Turbulent bubbly flow under unsteady breaking waves *M. Derakhti, J. Kirby*	**E1.03** Magnetic Field Induced by a Submerged Inhomogenous Current *D. Sobien, E. Paterson*	**E1.04** Large-eddy simulation of oil slicks from deep water blowouts *D. Yang, M. Chamecki, C. Meneveau*	**E1.05** Comparing fixed and dynamic-salinity models of sea ice *D. Rees Jones, G. Worster*	
E2. Convection and Buoyancy-Driven Flows III: Thermal Instability Room: 324 Chair: J. M. Floryan, U. of Western Ontario	**E2.01** Stability transitions and energy pathways in horizontal convection at large Rayleigh numbers *B. Gayen, R. Griffiths, G. Hughes*	**E2.02** Instabilities of Natural Convection in a Periodically Heated Layer *M. Hossain, J. Floryan*	**E2.03** On the transition to chaos of natural convection between two infinite differentially heated vertical plates *Z. Gao, B. Podvin, A. Sergent, S. Xin, P. le Quere, L. Tuckerman*	**E2.04** Spanwise plumes in wakes behind heated cylinder *A. S, A. S, S. A*	**E2.05** Plate-like convection in fluids with temperature-dependent viscosity *A. Mancho, J. Curbelo*	
E3. Multiphase Flows III Room: 325 Chair: D. Tolga Akcabay, U. of Michigan	**E3.01** Computation of Cavitating Flow in a Francis Hydroturbine *D. Leonard, J. Lindau*	**E3.02** Understanding and Toward Controlling the Hydroelastic Response and Stability of Hydrofoils in Cavitating Flows *D. Akcabay, Y. Young*	**E3.03** An acoustically accurate method to simulate turbulent cavitating flows *A. Gnanaskandan, K. Mahesh*	**E3.04** Measurements on a cavitating wedge *H. Ganesh, S. Makiharju, S. Ceccio*	**E3.05** Apker Prize Lecture: Using 3D Printing and Stereoscopic Imaging to Measure the Alignment and Rotation of Anisotropic Particles in Turbulence *G. Marcus, S. Parsa, S. Kramel, R. Ni, G. Voth*	
E5. CFD III: LES II Room: 327 Chair: P. Pisciuneri, U. of Pittsburgh	**E5.01** Forcing of Wind Turbine Blade Boundary Layer Dynamics by Atmospheric Turbulence with Hybrid URANS-LES *G. Vijayakumar, A. Lavely, B. Jayaraman, B. Craven, J. Brasseur*	**E5.02** HPC of Loading Transients on a 5-MW Wind Turbine Rotor by Atmospheric Turbulence Eddies *A. Lavely, G. Vijayakumar, B. Craven, B. Jayaraman, T. Nandi, E. Paterson, J. Brasseur*	**E5.03** Coupling the Actuator Line and Finite Element Methods to Model Fluid Structure Interaction of a Commercial Wind Turbine in the Atmosphere *J. Motta, P. Jha, R. Campbell, S. Schmitz, J. Brasseur*	**E5.04** Large Eddy Simulation of a turbulent flow past a wind turbine placed on an undulated wall *K. Carrasquillo, S. Leonardi*	**E5.05** Numerical study of the Interaction between Nonsteady Transition and Separation on Oscillating Airfoils *T. Nandi, B. Jayaraman, A. Lavely, G. Vijayakumar, E. Paterson, J. Brasseur*	**E5.06** A Method for Stable Computations in the Presence of Strong Vortices at Outflow Boundaries *S. Dong*
E6. Microfluids: Particles I - Orientation and Self-Assembly Room: 328 Chair: J. Shan, Rutgers U.	**E6.01** Hybrid Opto-electric Manipulation of Macromolecules *S. Wereley*	**E6.02** Customizing mesoscale self-assembly with 3D printing *N. Vandewalle, M. Poty, G. Lumay*	**E6.03** Electro-orientation of Carbon Nanotubes in Polymer Suspensions *R. Castellano, G. Giraldo, C. Akin, J. Shan*	**E6.04** A hexatic-to-disorder transition in colloidal crystals near electrodes: Rapid annealing of polycrystalline domains *C. Dutcher, T. Woehl, N. Talken, W. Ristenpart*	**E6.05** Electrokinetically driven reversible self-assembly of colloidal particle bands near the wall *N. Cevheri, M. Yoda*	
E7. Microfluids: Porous Media Room: 329 Chair: H. Kim, Seoul National U.	**E7.01** Regimes of gas transport through macroscopic areas of multi-layer graphene *M. Boutilier, R. Karnik, C. Sun, N. Hadjiconstantinou*	**E7.02** Molecule permeation and gas separation by nanoporous graphene membranes *N. Hadjiconstantinou, C. Sun, M. Boutilier, R. Karnik*	**E7.03** Dehydration induced phase transitions in a microfluidic droplet array for the separation of biomolecules *C. Nelson, S. Anna*	**E7.04** Buckling of a colloid-armored bubble *N. Taccoen, D. Gunes, C. Baroud*	**E7.05** Does the hourglass shape of aquaporins optimize water permeability? *S. Gravelle, L. Joly, F. Detcheverry, C. Ybert, C. Cottin-Bizonne, L. Bocquet*	
E8. Particle-Laden Flows III: Particle-Turbulence Interaction Room: 330 Chair: D. Richter, U. of Notre Dame	**E8.01** Feedback effect on the large-scale fluid motion in wall-bounded gas-solid disperse flow *Y. Mito*	**E8.02** Effects of small particles on coherent structures in particle-laden near-wall turbulence *J. Lee, C. Lee*	**E8.03** Laminar-turbulent transition of channel flows: the effect of neutrally buoyant finite-size particles *M. Abbas, V. Loisel, O. Masbernat, E. Climent*	**E8.04** Anisotropy of inertial-particle clustering in homogeneous turbulent shear flow *P. Sukheswalla, L. Collins*	**E8.05** Preferential Concentration Driven Instability of Sheared Gas-Solid Suspensions *M. Kasbaoui, D. Koch, G. Subramanian, O. Desjardins*	
E9. Biofluids: General III - Pumping Phenomena Room: 333 Chair: A. Staples, Virginia Polytechnic Institute and State U.	**E9.01** A bioinspired pumping model for flow in a microtube with rhythmic wall contractions *Y. Aboelkassem, A. Staples*	**E9.02** Electro-dynamic suction pumping at small scales *A. Baird, L. Miller*	**E9.03** Urinal Dynamics *R. Hurd, K. Hacking, B. Haymore, T. Truscott*	**E9.04** The Hydrodynamics of Urination: to drip or jet *J. Pham, P. Yang, J. Choo, D. Hu*	**E9.05** The role of amniotic fluid in force transfer during human birth *A. Baumer, A. Lehn, M. Leftwich*	
E10. Jets II Room: 334 Chair: M. Glauser, Syracuse U.	**E10.01** Reduced-order modeling of wavepackets in controlled jets with corrugated profiles *A. Sinha, A. Uzun, T. Colonius*	**E10.02** Towards High Speed Jet Noise Reduction Using Time-Resolved PIV *Z. Berger, M. Berry, P. Shea, B. Kiel, N. Jiang, B. Noack, S. Gogineni, M. Glauser*	**E10.03** Analysis and comparison of non-axisymmetric and circular nozzle configurations of a high speed jet *M. Berry, B. Kiel, Z. Berger, N. Jiang, S. Gogineni, M. Glauser*	**E10.04** The influence of the density ratio on the linear frequency response of low-density jets *W. Coenen, A. Sevilla, L. Lesshafft*	**E10.05** Structure of backward facing step flow in low Reynolds number controlled by synthetic jet array with different injection velocities *S. Takano*	

Sunday Afternoon, 24 November 2013						
Session	**16:45**	**16:58**	**17:11**	**17:24**	**17:37**	**17:50**
E11. Bubbles III: Soap, Films and Foams Room: 335 Chair: K. Connington, City College of New York	**E11.01** How are soap bubbles blown? Fluid dynamics of soap bubble blowing *J. Davidson, L. Lambert, E. Sherman, T. Wei, S. Ryu*	**E11.02** Coalescence of soap bubbles: petals and fractals *B. Tan, S. Gonzalez Avila, C. Ohl*	**E11.03** Plastic and Elastic Deformations of Foam Bubbles Driven by Oscillatory Compression *K. Feitosa, N. Hagans, C. O'Dea*	**E11.04** Crack Propagation Dynamics and Film Instability in Liquid Foams *S. Hilgenfeldt, P. Stewart, S. Davis*		
E12. Vortex Dynamics and Vortex Flows III Room: 336 Chair: S. Tavoularis, U. of Ottawa	**E12.01** Jet Interactions in a Feedback-Free Fluidic Oscillator in the Transition Region *M. Tomac, J. Gregory*	**E12.02** Characterization of self-excited fluidic energy harvesters in uniform flows *V. Azadeh Ranjbar, C. Cler, N. Elvin, Y. Andreopoulos*	**E12.03** Fluid-membrane dynamics of energy harvesting eel immersed in a square cylinder wake *Y. Liu, Y. Yu*	**E12.04** Estimating the pressure forcing on a flexible piezoelectric beams exerted by a passing vortex using time-resolved PIV data *O. Goushcha, N. Elvin, Y. Andreopoulos*	**E12.05** Energy Harvesting from an Oscillating Flat Plate in a Uniform Flow *B. Strom, J. Franck, K. Breuer*	
E13. Focus Session: Marine Hydrokinetic Energy Conversion III Room: 301 Chair: L. Luznik, United States Naval Academy	**E13.01** Flow Structures and Energy Capture from an Oscillating Hydrofoil *J. Franck, S. Frank, S. Mandre*	**E13.02** On the effects of turbine geometry on the far wake dynamics of an axial flow hydrokinetic turbine *F. Sotiropoulos, X. Yang, S. Kang*	**E13.03** Large-eddy simulation of the flow over a hydrokinetic turbine mounted on an erodible bed *X. Yang, A. Khosronejad, F. Sotiropoulos*	**E13.04** Numerical Modeling and Experimental Analysis of Scale Horizontal Axis Marine Hydrokinetic (MHK) Turbines *T. Javaherchi, N. Stelzenmuller, J. Seydel, A. Aliseda*	**E13.05** Simulation of Marine Hydrokinetic Turbines in Unsteady Flow using Vortex Particle Method *D. Sale, A. Aliseda*	
E14. Experimental Techniques III: Pressure Sensitive Paint Room: 302 Chair: J. Gregory, Ohio State U.	**E14.01** Identification of the resonant modes in supersonic impinging jets using fast response pressure sensitive paint *T. Davis, A. Edstrand, F. Alvi, L. Cattafesta, D. Yorita, K. Asai*	**E14.02** Simultaneous pressure and velocity measurements using multi-dye microspheres implementing an intensity-ratio method *D. Lacroix, J. Massing, C. Cierpka, G. Li, D. Dabiri, G. Khalil*	**E14.03** Pressure and velocity field measurements of pulsating flow in a square channel y-junction *M. Pastuhoff, A. Kalpakli, P. Alfredsson*	**E14.04** Temperature Cancellation Method of Motion-Capturing Pressure-Sensitive Paint System *H. Sakaue, Y. Yamada, T. Okabe, T. Miyazaki*	**E14.05** Characterizations of Inorganic Electro-Luminescence as an Excitation Source of Pressure-Sensitive Paint Measurement System *Y. Iijima, H. Sakaue*	**E14.06** Surface Pressure Measurements from Multiline Single-Component Molecular Tagging Velocimetry *D. Olson, A. Naguib, M. Koochesfahani*
E16. Biofluids: Physiological III - Experimental Studies in Cardiovascular Flows Room: 304 Chair: S. Hendabadi, Illinois Institute of Technology	**E16.01** Effect of mitral orifice shape on intra-ventricular filling fluid dynamics *I. Okafor, Y. Angirish, A. Yoganathan, A. Santhanakrishnan*	**E16.02** Effect of varying heart rate on intra-ventricular filling fluid dynamics *A. Santhanakrishnan, I. Okafor, Y. Angirish, A. Yoganathan*	**E16.03** WITHDRAWN .	**E16.04** Assessment of transmitral flow after mitral valve edge-to-edge repair using High-speed particle image velocimetry *M. Jeyhani, S. Shahriari, M. Labrosse, L. Kadem*	**E16.05** Flow Behavior in the Left Heart Ventricle Following Apico-Aortic Bypass Surgery *S. Shahriari, M. Jeyhani, M. Labrosse, L. Kadem*	
E17. Biofluids: Locomotion III - Flying Room: 305 Chair: .	**E17.01** Lift enhancement in flying snakes *A. Krishnan, J. Socha, P. Vlachos, L. Barba*	**E17.02** On the hydrodynamics of ray-like swimming *R. Bottom II, I. Borazjani, E. Blevins, G. Lauder*	**E17.03** Experimental study of the fluid structure interaction for falling cards *R. Tian, C. Sadler, F. Shu*	**E17.04** An elastic body impacting the water surface; inspired by diving birds *S. Jung, A. Ochs, S. Gart*	**E17.05** Could flapping foil propulsion become a commercial shipping reality? *B. Epps*	
E18. Flow Visualization Room: 306/307 Chair: J. Wetlaufer, U. of Oxford	**E18.01** Seminar in Flow Visualization at Lafayette College: Variations on the Hertzberg Effect *J. Rossmann*	**E18.02** Student designed experiments to learn fluids *C. Stern*	**E18.03** Designing and Creating a Set of New Lab Experiments for a Traditional Fluid Mechanics Course in Civil Engineering *D. Budny*	**E18.04** That is Cool: the Nature Of Aesthetics in Fluid Physics *J. Hertzberg*	**E18.05** F*** Yeah Fluid Dynamics: Lessons from online outreach *N. Sharp*	**E18.06** Visualization of Tensor Quantities Used in Computational Turbulent Combustion *T. Luciani, A. Maries, G. Marai, M. Nik, S. Yilmaz*
E19. Rarefied Gases and DSMC Room: 310/311 Chair: D. Levin, Pennsylvania State U.	**E19.01** Study of shock-shock interactions for a Double Wedge using the DSMC Approach *D. Levin, V. Patil, S. Gimelshein, J. Austin*	**E19.02** Measurement of Tangential Momentum Accommodation Coefficient (TMAC) using a Disc Spin-Down Experiment in Low Pressure Gas *T. Acharya, J. Falgoust, M. Martin, R. Rasmussen*	**E19.03** Maximum-entropy reconstruction method for moment-based solution of the Boltzmann equation *D. Summy, D. Pullin*	**E19.04** Shock Structure at Moderate and Large Mach Numbers *S. Paolucci, C. Paolucci*	**E19.05** Thermal transpiration of a rarefied gas between parallel plates with different accommodation coefficients *T. Doi*	**E19.06** The role of divergences for shock waves *F. Uribe*
E20. Boundary Layers IV: Flow through Pipes Room: 315 Chair: S. B. Pope, Cornell U.	**E20.01** Large-eddy simulation of turbulent pipe flow at large Reynolds number *N. Saito, D. Pullin, H. Blackburn*	**E20.02** Deconstructing the effectiveness of opposition control in turbulent pipe flow *M. Luhar, A. Sharma, B. McKeon*	**E20.03** Mechanism for skin friction reduction in temporally accelerated turbulent pipe flow *J. Lee, R. Adrian*	**E20.04** Distinct organisational states of large-scale motions in turbulent pipe flow *F. Sogaro, D. Dennis*	**E20.05** Statistics and large scales in turbulent pipe and channel flows *J. Lee, J. Lee, H. Sung*	

Sunday Afternoon, 24 November 2013						
Session	**16:45**	**16:58**	**17:11**	**17:24**	**17:37**	**17:50**
E21. Biofluids: Physiological IV - Experimental Studies in Respiratory Flows Room: 316 Chair: D. Schiavazzi, U. of California, San Diego	**E21.01** Liquid Therapy Delivery Models Using Microfluidic Airways *M. Mulligan, J. Grotberg, D. Waisman, M. Filoche, J. Sznitman*	**E21.02** Acinus-on-a-chip: a microfluidic platform for pulmonary acinar flows *R. Fishler, M. Mulligan, J. Sznitman*	**E21.03** Steady Flow in Subject-Specific Human Airways from Mouth to Sixth Bronchial Generation *A. Banko, F. Coletti, D. Schiavazzi, C. Elkins, J. Eaton*	**E21.04** Characterization of Ventilatory Modes in Dragonfly Nymph *C. Roh, T. Saxton-Fox, M. Gharib*	**E21.05** Particle Image Velocimetry Measurements in an Anatomically-Accurate Scaled Model of the Mammalian Nasal Cavity *C. Rumple, M. Krane, J. Richter, B. Craven*	
E23. Turbulence: Theory III - Wall-Bounded Flows Room: 318 Chair: D. Gayme, Johns Hopkins U.	**E23.01** Phase relationships and amplitude modulation in wall turbulence *B. McKeon, D. Chung*	**E23.02** An Integral Method to Evaluate Wall Heat Flux Suitable For Experimental Data *A. Ebadi, F. Mehdi, C. White*	**E23.03** Universal Karman constant in canonical wall turbulence *Z. She, X. Chen, F. Hussain*	**E23.04** Variation approach to describe bulk flow of wall turbulence *X. Chen, F. Hussain, Z. She*	**E23.05** Nonlinearity and the energy cascade in the resolvent analysis of wall turbulence *A. Sharma, B. McKeon*	
E24. Aerodynamics I Room: 319 Chair: M. Gad-el-Hak, Virginia Commonwealth U.	**E24.01** Flow Structure on a Rotating Wing: Effect of Rossby Number *M. Wolfinger, D. Rockwell*	**E24.02** Vortex Interaction on Low Aspect Ratio Membrane Wings *R. Waldman, K. Breuer*	**E24.03** Unique stability modes of low aspect ratio wings *K. Mohseni, M. Shields*	**E24.04** Vorticity Confinement Applied to Turbulent Wing Tip Vortices for Wake-Integral Drag Prediction *K. Pierson, A. Povitsky*	**E24.05** Lattice Boltzmann simulations of deformation and efficiency of a chord-wise flexible wing in a free stream flow *D. Qi, G. He*	**E24.06** Force Element Theory for Finite Wings at Low Reynolds numbers *C. Chu, J. Lee, C. Hsieh, C. Chang*
E25. Flow Control III - Drag Reduction Room: 320 Chair: W. Huebsch, West Virginia U.	**E25.01** Reduction of turbulent skin-friction drag by oscillating discs *D. Wise, P. Ricco*	**E25.02** Designing smart duct geometries for low frictional losses *G. Daschiel, V. Krieger, J. Jovanovic, B. Frohnapfel*	**E25.03** Model-based analysis of the effect of spanwise wall oscillations on drag reduction at high Reynolds numbers *A. Zare, R. Moarref, M. Jovanovic*	**E25.04** Drag-Reduction Effectiveness of Riblet Films in Adverse Pressure Gradients *A. Boomsma, F. Sotiropoulos*		
E26. Reacting Flows III: Coal & Soot Room: 321 Chair: B. Shotorban, The U. of Alabama in Huntsville	**E26.01** Transported PDF modeling for pulverized coal combustion *X. Zhao, D. Haworth*	**E26.02** A Study of Turbulence-Chemistry-Soot-Radiation Interaction in Luminous Turbulent Jet Flames *S. Roy, D. Haworth*	**E26.03** Large-eddy simulation of pulverized coal swirl jet flame *M. Muto, H. Watanabe, R. Kurose, S. Komori, S. Balusamy, S. Hochgreb*	**E26.04** Damköhler number effects on soot formation and growth in turbulent nonpremixed flames *F. Bisetti, A. Attili, M. Mueller, H. Pitsch*	**E26.05** Monte Carlo Simulation Of Soot Evolution along Lagrangian Trajectories in a Turbulent Flame *A. Abdelgadir, K. Zhou, A. Attili, F. Bisetti*	
E27. Supersonic and Hypersonic Flows: Shock Capturing and Focusing Room: Spirit of Pittsburgh Ballroom A Chair: V. Eliasson, U. of Southern California	**E27.01** Shock Wave Mitigation Using Lessons Learned from Shock Focusing Techniques *Q. Wan, V. Eliasson*	**E27.02** Shock focusing using multiple micro-blast waves *S. Qiu, Z. Zhang, V. Eliasson*	**E27.03** Experiments and simulations of shock focusing in thin water-filled convergent structures *V. Eliasson, C. Wang, S. Qiu*	**E27.04** Effects of Heat Conduction on Artificial Viscosity Methods for Shock Capturing *A. Cook*	**E27.05** Numerical simulations of blast/shock wave propagations after nuclear explosions *S. Song, J. Choi, Y. Li, C. Lee*	
E28. Viscous Flows I: Flow Past Interferences Room: Spirit of Pittsburgh Ballroom B/C Chair: R. McLaughlin, The U. of North Carolina at Chapel Hill	**E28.01** Oscillatory Stokes Flow Past a Slip Cylinder *D. Palaniappan*	**E28.02** Viscous power-law flow past a finite flat plate *L. Xu, M. Nitsche*	**E28.03** Experimental and modeling study of global circulation by bent rod precession in low Reynolds number flows *R. Camassa, J. Martindale, R. McLaughlin, L. Vicci, L. Zhao*	**E28.04** The Oscillatory Motion of a Sphere in a Stokes Flow *F. Box, A. Thompson, T. Mullin*		
E30. Turbulence: Shear Layers I - Simulations Room: 408 Chair: C. Madnia, U. at Buffalo - The State University of New York	**E30.01** Characteristics of the Turbulent/Non-Turbulent Interface in Compressible Shear Layers *N. Vaghefi, C. Madnia*	**E30.02** Numerical study of shear layer instability in transverse jets *K. Mahesh, P. Iyer*	**E30.03** The Turbulent/Non-Turbulent Interface in Non-Premixed Reacting Mixing Layers *R. Jahanbakhshi, N. Vaghefi, C. Madnia*	**E30.04** Direct Numerical Simulation of a Temporal Mixing Layer and Detection of the Turbulent/Non-Turbulent Interface *F. Hennig, J. Boschung, M. Gauding, N. Peters*	**E30.05** Temporal behavior of strong shear layers in high Reynolds number turbulence *P. Jha, T. Ishihara*	
E31. Porous Media Flows IV: Electrochemical and Heat Transfer Devices Room: 402 Chair: Y. Sun, Drexel U.	**E31.01** Capacitive Charging and Desalination with Porous Electrodes *H. Hu, M. Li, H. Bau*	**E31.02** GPU-enabled Computational Model of Electrochemical Energy Storage Systems *C. Andersen, G. Qiu, N. Kandasamy, Y. Sun*	**E31.03** Simulation of water splitting reaction in porous media using Random Walk particle tracking method *N. Rahmatian, J. Petrasch, R. Mei, J. Klausner*	**E31.04** Estimation of Porous Medium Tortuosity Directly from Flow Path Lines *S. Pakalapati, I. Celik*		

Sunday Afternoon, 24 November 2013						
Session	**16:45**	**16:58**	**17:11**	**17:24**	**17:37**	**17:50**
E32. Surface Tension Effects III: General Interfacial Phenomena Room: 403 Chair: S. Mitra, U. of Alberta	**E32.01** Low Interfacial Tension Measurement with Synthetic Schlieren Imaging *A. Mishra, V. Kulkarni, J. Khor, S. Wereley*	**E32.02** Inertial Rise in Short Capillaries *O. Shardt, P. Waghmare, S. Mitra, J. Derksen*	**E32.03** Controlled Coating of Self-Assembled Sphere Clusters by Gravitational Forcing *S. Jones, A. Ahuja, V. Truong, S. Tsai*	**E32.04** Electric field driven bubble motion in microgravity *B. Khusid, D. Qasem, E. Elele, J. Tang, Y. Shen*	**E32.05** Effects of particle self-assembly and structural disjoining pressure on wetting kinetics of nanofluid droplet *G. Lu, H. Hu, Y. Duan, Y. Sun*	
E33. Drops V: Buoyancy-Driven Motion Room: 404 Chair: T. Ward, Iowa State U.	**E33.01** Sedimentation and deformation of an aqueous sodium hydroxide drop in vegetable oil *A. White, H. Hyacinthe, T. Ward*	**E33.02** Steady, axisymmetric, buoyancy-driven motion of a drop rising through a less viscous liquid *L. Steytler, J. Feng, A. Pearlstein*	**E33.03** Gravitational Interactions of Two Small Evaporating Drops *M. Rother*	**E33.04** Ascending dynamics of a swarm of drops in a stratified fluids *A. Ardekani, M. Bayareh, S. Dabiri*	**E33.05** Low Temperature Distillation for Desalination *W. Schultz*	
E34. Drops VI: Bouncing Drops Room: 405 Chair: D. Hu, Georgia Institute of Technology	**E34.01** Droplets walking in a rotating frame: from quantized orbits to wavelike statistics *D. Harris, J. Bush*	**E34.02** Pilot-wave dynamics in a rotating frame: on the emergence of orbital quantization *A. Oza, D. Harris, R. Rosales, J. Bush*	**E34.03** Quantization of a particle guided by its own pilot-wave *S. Perrard, M. Labousse, E. Fort, Y. Couder*	**E34.04** "Quantum" interference with bouncing drops *T. Bohr, A. Andersen, J. Madsen, C. Reichelt, B. Lautrup, C. Ellegaard, M. Levinsen*	**E34.05** The hydrodynamic boost factor for walking droplets *J. Bush, A. Oza, J. Molacek*	
E35. Suspensions III: Confined Flows Room: 406 Chair: J. F. Morris, City College of New York	**E35.01** Shear stress developed on concentrated suspensions of large particles in turbulent shear flow *E. Linares Guerrero, M. Hunt*	**E35.02** Modeling the Behavior of Confined Colloidal Particles Under Shear Flow *F. Mackay, C. Denniston, M. Karttunen*	**E35.03** Suspension microstructure in a microporous flow *T. Perera, J. Gilchrist*	**E35.04** Microfluidic flow-stabilized solids: formation and deformation *C. Ortiz, R. Riehn, K. Daniels*	**E35.05** Dispersion of Suspensions in Unsteady Microchannel Flows *M. Maxey, A. Howard, L. WinklerPrins, A. Tripathi, K. Yeo*	
E36. Waves I Room: 407 Chair: .	**E36.01** Wavemaking by a vortex pair in stratified flow *S. Shaw, J. McHugh*	**E36.02** Resonance Van Hove Singularities in Weak Wave Turbulence *Y. Shi, G. Eyink*	**E36.03** Numerical study of nonlinear full wave acoustic propagation *R. Velasco-Segura, P. Rendon*	**E36.04** Wave propagation in a viscous fluid with a pipeline shear mean flow and application for ultrasonic flow meter *Y. Chen, Y. Huang, X. Chen*	**E36.05** Forced Convective Thermal Transport and Flow Stability Characteristics in Near-Critical Supercritical Fluid *N. Hasan, B. Farouk*	**E36.06** WITHDRAWN .

1A. Student Poster Session
18:15–19:00, South Terrace Foyer, 3rd Floor

ENERGY AND APPLICATIONS

1A.2 The Study Of A Liquid Droplet Falling Through Two Immiscible Layers Of Liquids Bianca Mesa

1A.3 The Effect Of Magnetic Fields On The Capture Of Magnetic Nanoparticles Chelsea Fujinaka, Chris Brazel, Rhythm Shah

1A.4 Using Thermo-Responsive, Fiber-filled Gels To Control Droplet Motion Gerald McFarlin IV, Xin Yong, Olga Kuksenok, Anna Balazs

1A.5 Effective Collecting Method Of Volatile Organic Compounds In Water By Bubbling Hitoshi Kida, Hayato Hori, Yuzo Nonoguchi, Masaharu Kameda, Ryoichi Sato

1A.6 Electrospray Of Solution Processed Nanomaterials Nicholas Brown, Paul Chiarot

1A.7 International Senior Design Service Learning Project: Creating A Water System For Kuna Nega In Panama City, Panama Dan Budny

1A.8 Aerodynamics Simulations For The D8 “Double Bubble” Aircraft Using The LAVA Unstructured Solver Sean Ballinger

1A.9 Improving Wind Turbine Array Efficiency Through Active Flow Control John-Michael Velarde, Guannan Wang, Patrick Shea, Mark Glauser, Luciano Castillo

1A.10 Optimal Hydrofoil Kinematics For Tidal Energy Extraction Sarah Frank, Shreyas Mandre, Jennifer Franck

1A.11 Development Of A Burner System And Rayleigh Scattering Method To Measure Soot Concentration For Diesel-Relevant Fuels Sara Fletcher, Brian Fisher

1A.12 Parameters Of A Steady State Model For In-Cylinder Flow Of An Internal Combustion Engine Elizabeth Fortner, Paul Puzinauskas, Nicholas Bolus

JETS, ACOUSTICS AND SHOCKWAVES

1A.14 Characterization Of Noise And Instability In A Commercial Burner Stewart Carpenter, Ajay Agrawal

1A.15 Identifying Potential Noise Sources Within Acoustic Signals Victoria Holcomb, Jacques Lewalle

1A.16 Comparison Of Methods For Identifying Noise Sources In Far-Field Acoustic Signals Andrew Tenney, Jacques Lewalle

1A.17 On The Critical Radii For Ramp Induced Shock Wave And Laminar Boundary Layer Interaction Bibin John, Vinayak Kulkarni

1A.18 Shock Wave Reflections In A Liquid Filled Thin Tube Shota Yamamoto, Yoshiyuki Tagawa, Masaharu Kameda

1A.19 A Focused Liquid Jet Using A Pressure Impulse Akihito Kiyama, Yuto Noguchi, Yoshiyuki Tagawa

1A.20 A New Classification For Liquid Jets Dynamics Bowen Ling, Ilenia Battiato

1A.21 Characterization Of Synthetic Jet Actuators Used For Jet Noise Reduction By Flow Control Alexis Zelenyak, Zachary Berger, Matthew Berry, Patrick Shea, Mark Glauser

1A.22 Heater Applications For High Speed Jets Jack Rossetti, Zachary Berger, Matthew Berry, Andre Hall, Mark Glauser

1A.23 Statistical Comparison Of Far-Field Noise Events In A Controlled Flow Ma=0.6 Jet Graham Freedland, Jacques Lewalle

1A.24 Focusing Of Cylindrical Liquid Jets Into Droplets Kristen Edwards, Amy McCleney, Philippe Bardet

BIOLOGICAL, MICRO AND COMPLEX FLUIDS

1A.26 Thin-Film Drainage And Droplet Adhesion In A Microfluidic Channel Jonathan Hui, Wei Wang, Peter Huang

1A.27 On The Heat Transfer And Flow Of A Non-homogenous Fluid Joseph Fiordilino, Ashwin Vaidya, Mehrdad Massoudi

1A.28 Remote Recoil Between Waves And Vortices In Superfluids Yuan Guo, Oliver Buhler

1A.29 Computational Models For Fluid-structure Interaction With A Poroelastic Structure Rana Zakerzadeh, Paolo Zunino, Martina Bukac, Ivan Yotov

1A.30 Engineered Asymmetric Synthetic Vesicles Li Lu, Paul Chiarot

1A.31 Fluid Mechanics Of The Vascular Basement Membrane In The Brain Mikhail Coloma, Jonathan Hui, Paul Chiarot, Peter Huang, Roxana Carare, Kenneth McLeod, David Schaffer

1A.32 A Simple Microfluidic-inspired Extensional Flow Device For Observation Of Small Aquatic Organisms: Design And Implementation Neil Thomas, Rachel Pepper, Dorian Liepmann, M.A.R. Koehl

1A.33 Mathematical Model And Simulation Of Particle Flow Around Choanoflagellates Using The Method Of Regularized Stokeslets Niti Nararidh

1A.34 Surface Patterning: Controlling Fluid Flow Through Dolphin And Shark Skin Biomimicry Lawren Gamble, Amy Lang, Michael Bradshaw, Eric McVay

1A.35 Vortex Formation On A Plunging Plate With Butterfly Inspired Surface Patterning Preston Powell, Amy Lang, Michael Bradshaw

TURBULENCE, STABILITY AND FLUID-STRUCTURE INTERACTION

1A.37 Equilibrium Configurations Of A Fiber In A Flow Pamela Guerron, Christopher Berghout, Bogdan Nita, Ashwin Vaidya

1A.38 Properties Of The Plasma Sheath Edge Above A Rectangular Depression In DONUT Thomas E. Steinberger, T.E. Sheridan

1A.39 Partially-Averaged Navier-Stokes Modeling Of Turbulent Swirling Flow Hosein Foroutan, Savas Yavuzkurt

1A.40 Pressure Driven Turbulent Flow In A Channel With Superhyrophobic Riblets Arian Yousefi, Ilenia Battiato

1A.41 Hydrodynamic Simulations Of Steady-State Density Inversion In Vertically Shaken Granular Layers Farheen Syeda, Josh Panfil, Jon Bougie

1A.42 Proposed Mechanism For Shock-Driven Stripe Patterns In Vertically Oscillated Granular Systems Alex Gilman, Stefanie Moertl, Jon Bougie

1A.43 The Gaussian Closure For Granular Gas Dynamics Lakshminarayanareddy Marapareddygarihanumanthu, Alam Meheboob, Santosh Ansumali

1A.44 An Alternative Nondimensional Vibration Frequency For Spanwise Tensioned Membranes In Low Re Flow Zheng Zhang, Andrew Wrist, James P. Hubner, Lawrence Ukeiley

1A.45 Numerical Simulation Of Rayleigh-Bernard Convection In A Cylindrical Container Norma Y. Sanchez-Torres, Erick J. Lopez-Sanchez, Sergio Hernandez-Zapata, Gerardo Ruiz-Chavarria

1A.46 Simulating The Motion Of Micro-capsules In Complex Geometries Lailai Zhu, Luca Brandt

1A.47 Examining Dynamic Stall For An Oscillating NACA 4412 Hydrofoil Eric McVay, Amy Lang, Lawren Gamble, Michael Bradshaw

1A.48 Interacting Hairpin Vortices Rijan Maharjan, Daniel Sabatino

VISCOUS FLOWS

1A.50 Measurement Of Traction Forces Exerted By The Foot In Motion Maria Fernanda Lugo-Bolanos, Shreyas Mandre, Madhusudhan Venkadesan, Mahesh Bandi

1A.51 The Influence Of Dome Size, Parent Vessel Angle, And Coil Packing Density On Coil Embolization Treatment In Cerebral Aneurysms David H. Frakes, Aprinda Indahlastari, Justin Ryan, M. Haithem Babiker, Priya Nair, Varsha Parthas

1B. Poster Session
18:15–19:00, Spirit of Pittsburgh Ballroom Gallery, 3rd Floor

ACOUSTICS

1B.2 Design Of An Acoustic Array For Comparison With An Alternative Source Localization Method Deshawn Coombs, Jacques Lewalle, Mark Glauser, Guannan Wang

AERODYNAMICS

1B.4 Vortex Generation By A Low-Camber Rotating Arc Wing Majid Molki

BIOFLUIDS

1B.6 Low-Reynolds-number Swimming Near A Wall Gaojin Li, Arezoo Ardekani

1B.7 Simulations Of The Burst And Coast Swimming Behavior Of Fish Quan Zhou, Keith Moored, Alexander Smits

1B.8 Reduction Of Urinary Tract Infections Caused By Urethral Catheter Through The Implementation Of Hydrophobic Coating And Geometrical Modifications Aya Gare

1B.9 Dynamics Of Surfactant Liquid Plugs At Bifurcating Lung Airway Models Hossein Tavana

1B.10 Computational Analysis Of Wake Structure And Body Forces On Marine Animal Research Tag Matthew Rosanio, Jacob Morrida, Melissa Green

1B.11 Physics Of Dielectrophoretic Trap By Analogy With Electrophoretic Paul Trap Jae Hyun Park

BUBBLES

1B.13 Saturation Of The Afterbounce Shape Instability In Single Bubble Sonoluminescence; Theory And Experiment Mogens Levinsen

COMPUTATIONAL FLUID DYNAMICS

1B.15 Large Eddy Simulation Of A Turbulent Flow In Two Dimensional Dunes Using An Immersed Boundary Method Getnet Agegnehu, Heather D. Smith

1B.16 A Brownian Dynamics Simulation Of A Colloidal Particle In An Alternating Electric Field Very Near An Electrode Lei Wang, Dennis Prieve

CONVECTION AND BUOYANCY-DRIVEN FLOWS

1B.18 Rayleigh-Taylor Instability: An Initial Condition Study Tom Finn, Sarat chandra Kuchibhatla, Devesh Ranjan

1B.19 Two-Way Natural Convection Of Divided Statically Unstable Fluid Layers Through Small Openings Christia Tsai

DROPS

1B.21 Investigation Of Interfacial Phenomena And Thermocapillary Effect On Drop Evaporation In Reduced Gravity Condition JingChang Xie, Hai Lin

1B.22 Size Distribution Of Spray Droplets At Different Temperature Ildoo Kim, Hyung Ju Lee, Ho Jin Choi, Ki-Young Hwang

1B.23 Droplet Motion Driven By Electro-elasto-capillary Effects Jaymeen Shah, Xin Yang, Ying Sun

1B.24 Stable Drop Formation And Deposition Control In Ink Jet Printing Of Polyvinylidene Fluoride Solution Nathaniel Thorne, Xin Yang, Ying Sun

1B.25 Evolution Of Vapor Into A Leidenfrost Layer During Drop Impact Sang Jun Lee, Ji San Lee, Namseop Kwon, Byung Mook Weon, Kamel Fezzaa, Jung Ho Je

FLOW CONTROL

1B.27 Investigation Of Flow Around Cylinder With Parallel Slit In A Circular Pipe Using Flow Visualization Approach Arumuru Venugopal, Lavish Ordia, Amit Agrawal, S.V. Prabhu

GENERAL FLUID DYNAMICS

1B.29 Modulation Of Flow Field Due To Near-bank Roots In Small Rivers Christian Frias, Jorge Abad, Eddy Langendoen

1B.30 Performance Test Of A Low Cost Roof-mounted Wind Turbine Bernardo Figueroa-Espinoza, Roberto Quintal, Clément Gou, Alicia Aguilar

1B.31 Flow Past 2-D Hemispherical Rigid Canopies Maria-Isabel Carnasciali

GEOPHYSICAL

1B.33 An Experimental Analog For The Study Of Waving Marine Grass In Tidal Currents Julia Lee, Ravi Singh, Shreyas Mandre

GRANULAR FLOWS

1B.35 Measurement Of Self Diffusion In A Two-dimensional Complex Plasma T.E. Sheridan

1B.36 Contact Dynamics Models For Spacecraft-Regolith Interactions Christine Hartzell, Melany Hunt

INDUSTRIAL APPLICATIONS

1B.38 Electric-Field-Enhanced Jumping-Droplet Condensation Nenad Miljkovic, Daniel Preston, Ryan Enright, Alexander Limia, Evelyn Wang

INSTABILITY

1B.40 Theoretical Models For The Stability Of A Liquid Ring On A Substrate Javier A. Diez, Alejandro G. González, Lou Kondic

MICROFLUIDS

1B.42 Response Of Microfluidic Fuel Cells To Secondary Flows Massimiliano Rossi, Christian J. Kähler

1B.43 Molecular Dynamics Simulation Of Dewetting Of Ultra-thin Liquid Film With Artificial Dry Patches Susumu Kono, Ichiro Ueno

1B.44 Local Fluorescence In Micro Channels For Particle Counting Mariana Centeno Sierra, Mathieu Hautefeuille, Catalina Stern

1B.45 Study On Fabrication Of Scaffold Using Three-dimensional Electrohydrodynamic Ink-jet Technique Han Seo Ko, Soo-Hong Lee, Pil-Ho Lee, Dae-Hoon Kim, Chiang Wei Yu, Sang Won Lee

1B.46 Effect Of Inhomogeneous Flow On Micro-scale Biomedical Gas S. Sen

MULTIPHASE FLOWS

1B.48 Energy And Momentum Transport In Microfluidic With Shear-driven Flows S. Sen

NANOFLUIDS

1B.50 Using Instability Of Nanometric Liquid Cu Films On SiO2 Substrates To Determine The Underlying Van Der Waals Potential Alejandro G. González, Javier A. Diez, Yueying Wu, Jason D. Fowlkes, Philip D. Rack, Lou Kondic

1B.51 Lithography-free Nanofluidic Concentrator Based On Droplets-on-demand System Miao Yu, Hongbo Zhou, Shuhuai Yao

NON-NEWTONIAN FLOWS

1B.53 Toward Generating Low-Friction Nanoengineered Surfaces With Liquid-Vapor Interfaces Chu Wang, Xin Yong, Lucy Zhang

1B.54 Parameter Effects On Shear Stress Of Johnson–Segalman Fluid In Poiseuille Flows Xiang Qiu, Jianping Luo, Yulu Liu

1B.55 Hertz Beyond Expectation Andong He, John Wettlaufer

PARTICLE-LADEN FLOWS

1B.57 Pressure Driven Flow Of Inhomogeneous Suspensions: Experiments And Theory Ashwin Vaidya, Mehrdad Massoudi, Siobhan Soltau, Gin Sanchez, Jillian Varner, Joseph Fiordilino

1B.58 Study Of Local Profiles Relative To The Particle Surface In A Forced Particle-Laden Turbulent Flow Oscar Castro, Orlando Ayala, Lian-Ping Wang

1B.59 Two-way Interactions In Particle-Laden Turbulent Channel Flow Cheng Peng, Oscar Castro, Orlando Ayala, Lian-Ping Wang

1B.60 Computationally And Experimentally Assessed Gravity-driven, Mono- And Bidisperse, Particle-laden Flows Shreyas Kumar, Kaiwen Huang, Matt Hin, Gilberto Urdaneta, Aliki Mavromoustaki, Jeffrey Wong, Sungyon Lee, Andrea Bertozzi

1B.61 Dynamics Of Transported Particulate Matter In Fluid Flows Steven Wang, Guy Metcalfe, Robert Stewart, Jie Wu

POROUS MEDIA FLOWS

1B.63 WITHDRAWN

ROTATING FLOWS

1B.65 The Interfacial Dynamics Between Two Immiscible Rotating Fluids Hua-Yi (Maggie) Hsu

SUSPENSIONS

1B.67 Liquid Flow Between Hydrodynamicaly Interacting Particles In Confined Systems Alvaro Gomez Marin, Massimiliano Rossi, Christian J. Kaehler

1B.68 Measurements Of Wall Shear Stress In A Planar Turbulent Couette Flow With Porous Walls Paul Beuther

1B.69 Atmosphere-ocean Exchanges Over Slow And Fast Wave Fields Qi Li, Elie Bou-Zeid, Nikki Vercauteren, Marc Parlange

1B.70 Comparison Between Prandtl, Navier-Stokes And Euler Solutions For 2D Flows In The Presence Of Solid Boundaries Marie Farge, Romain Nguyen van yen, Matthias Waidmann, Kai Schneider, Rupert Klein

1B.71 Non-Dimensionalization And Scaling Of Helmholtz Equation And Schrodinger Equation, Which Reformulated For Fluid Dynamics Ahmad Reza Estakhr

1B.72 Kinetic Energy-Preserving Discretization Schemes For High Reynolds Number Propulsive Applications Ayaboe Edoh, Ann Karagozian

VORTEX DYNAMICS

1B.74 The Moore Singularity In The Evolution Of A Vortex Sheet Through Longitudinal Diffusion Ujjayan Paul

POST-DEADLINE

1B.76 Interfacial Waves Generated By Contact Line Motion Through Electrowetting Jonghyun Ha, Jaebum Park, Yunhee Kim, Jungmok Bae, Ho-Young Kim

1B.77 Eigenmode Analysis Of Advective-diffusive Transport In Micromixers By The Diffusive Mapping Method Patrick Anderson, Michel Speetjens, Oleksandr Gorodetskyi, Max Giona

1B.78 A Combined RANS-LES Simulation Of A Turbulent Round Jet In A Large Enclosure Sasan Salkhordeh, Sagnik Mazumdar, D. Tyler Landfried, Anirban Jana, Mark Kimber

1B.79 Dynamic Behavior Of Electrowetting-based Liquid Prisms Jaebum Park, Jonghyun Ha, Kyuhwan Choi, Jungmok Bae, Ho-Young Kim

1B.80 Space-Time Pressure-Velocity Correlations In A High Reynolds Number Turbulent Boundary Layer Yoshitsugu Naka, Michel Stanislas, Jean Marc Foucaut, Sébastien Coudert

1B.81 Shear Driven-Streaming Potential Flow In A Charged Slit Microchannel Behnam Khorshidi, Subir Bhattacharjee

1B.82 Experimental Investigation And Analysis Of Continuous Flow Through Trace Gas Preconcentrator Jihyun Kim

1B.83 Theoretical Models For Trace Gas Preconcentrators Jihyun Kim

1B.84 Energy-Efficient Rate-Based Particle Separation Diana Lievano, Tathagata Bhattacharya, Joseph McCarthy

1B.85 3D CFD Simulation Of Horizontal Spin Casting Of High Speed Steel Roll Konstantin Redkin, Boris Balakin, Christopher Hrizo, Jeffrey Vipperman, Isaac Garcia

1B.86 The Effect Of Stress-free Shapes On The Red Blood Cell Dynamics Prosenjit Bagchi, Daniel Cordasco, Alireza Yazdani

1B.87 Physical Prototype Development For The Real-Time Detection And Mitigation Of Hazardous Releases Into A Flow System Sara Rimer, Nikolaos Katopodes

1B.88 Cooling Of A Tapped Granular Column Anthony Rosato, Luo Zuo, Denis Blackmore

1B.89 A Dynamical Systems Approach To The Alpha Problem For Rayleigh-Taylor Daniel Israel

1B.90 Modeling Dilute Gas-Solid Turbulent Flows Using Moment Methods Dennis Dunn, Kyle Squires

1B.91 The Effects Of A Spatially Variant Velocity Field On Stretching: Intuitive Measures Jason Nixon, David Bigio

1B.92 Nature-Inspired Airfoils For Environmental Noise Reduction Suyeong Han, Richard Kyung

Monday, 25 November 2013
Sessions G – L

Monday Morning, 25 November 2013						
Session	**08:00**	**08:13**	**08:26**	**08:39**	**08:52**	**09:05**
G1. Geophysical: Oceanographic IV Room: 323 Chair: M. Paoletti, U. of Texas at Austin	**G1.01** Nonlinear generation of harmonics by an internal wave beam incident on a model oceanic pycnocline: numerical study *P. Diamessis, S. Wunsch, I. Delwiche*	**G1.02** Nonlinear generation of harmonics by an internal wave beam incident on a model oceanic pycnocline: laboratory experiments *S. Wunsch, I. Delwiche, P. Diamessis*	**G1.03** Mixing by internal gravity waves that break at sloping topography *V. Chalamalla, S. Sarkar*	**G1.04** Wave diffraction by a small elevation of the bottom in the presence of an underwater barrier *S. Martha, A. Choudhary*	**G1.05** Resonant boundary currents fromtidal flow over topography need not generate intense internal waves *H. Swinney, A. Dettner, M. Paoletti*	**G1.06** Internal wave generation by tidal flow over topography in the deep ocean *M. Paoletti, M. Drake, H. Swinney*
G2. Convection and Buoyancy-Driven Flows IV: Rayleigh-Benard Convection Room: 324 Chair: R. Stevens, Johns Hopkins U.	**G2.01** Kinetic energy transport in Rayleigh-Bénard convection *K. Petschel, S. Stellmach, M. Wilczek, J. Lülff, U. Hansen*	**G2.02** Statistical description of Rayleigh-Bénard convection yields limit cycle behavior *J. Luelff, M. Wilczek, R. Friedrich, R. Stevens, D. Lohse*	**G2.03** Resolving the fine-scale structure in turbulent Rayleigh-Benard convection *J. Scheel, M. Emran, J. Schumacher*	**G2.04** Mixed convection in a Rayleigh-Bénard cell with an imposed mean wind *L. Bouhlali, A. Scagliarini, H. Einarsson, ´ Gylfason, F. Toschi*	**G2.05** Statistical classification of flow morphology in rapidly rotating Rayleigh-Bénard convection: A numerical and experimental synthesis *D. Nieves, A. Rubio, K. Julien*	**G2.06** Active transport in chaotic Rayleigh-Bénard convection *C. Mehrvarzi, M. Paul*
G3. Multiphase Flows IV Room: 325 Chair: S. Garrick, U. of Minnesota	**G3.01** Simulation of sprays using a Lagrangian filtered density function approach *W. Liu, S. Garrick*	**G3.02** Eulerian CFD modeling and X-ray validation of non-evaporating diesel spray *Q. Xue, S. Som, S. Quan, E. Pomraning, P. Senecal*	**G3.03** LES/FMDF of High Speed Spray Combustion *A. Irannejad, F. Jaberi*	**G3.04** Analysis of an Electrostatic Spray Injector *M. Ryan, J. Tennis, C. Kweon, M. Benson, B. Van Poppel*	**G3.05** Effects of heat release on homogeneous nucleation in turbulent flows *J. Liu, S. Garrick*	**G3.06** Direct numerical simulation of leaky dielectrics with application to electrohydrodynamic atomization *M. Owkes, O. Desjardins*
G4. Separated Flows I: Diffusers and Massively Separated Flows Room: 326 Chair: D. You, Carnegie Mellon U.	**G4.01** Asymmetric Separation and Perturbation Sensitivity in an Annular Diffuser *J. Coffman, S. Morris, A. Jemcov, J. Cameron*	**G4.02** Multiple local recirculations to reduce flow separation and increase efficiency of diffusers *A. Mariotti, G. Buresti, M. Salvetti*	**G4.03** Unsteady Structure of Three-Dimensional Stall Cells *K. Disotell, J. Gregory*	**G4.04** Turbulence characteristics of separated boundary layer flow under unsteady pressure gradients using direct numerical simulation *J. Park, W. Bromby, D. You*	**G4.05** Roughness and Reynolds number effects in turbulent flows over forward facing step *E. Thacher, E. Essel, M. Tachie*	**G4.06** Spanwise correlation lengths of unsteady surface pressure behind a backward facing step *M. Bilka, M. Paluta, S. Morris*
G5. CFD IV Room: 327 Chair: S. Levent Yilmaz, MathWorks	**G5.01** 2D Unstructured Finite Volume Lattice Boltzmann Model for Flow with Complex Geometric Boundaries *L. Chen, L. Schaefer*	**G5.02** A Second-Order Finite-Difference Scheme for the Lattice Boltzmann Method *P. Rao, L. Schaefer*	**G5.03** A Block-Structured Adaptive Mesh Refinement Technique with a Finite-Difference-Based Lattice Boltzmann Method *A. Fakhari, T. Lee*	**G5.04** Numerical investigations on the vortex-induced vibration of moving rigid body by using the Lattice Boltzmann Method *X. Jiang, T. Lee, Y. Andreopoulos, Z. Wang*	**G5.05** Isothermal Multiphase Flow using a Multi-domain Lattice Boltzmann Method *C. Forster, M. Smith*	**G5.06** A Highly-Parallelized Perfectly Stirred Reactor (PSR) Model Using GPU Acceleration *S. Adhikari, A. Chandy*
G6. Microfluids: Particles II - Electrokinetically Induced Flow Room: 328 Chair: G. Drazer, Rutgers U.	**G6.01** Direct numerical simulations (DNS) of particles in spatially varying electric fields *E. Amah, M. Janjua, I. Fischer, P. Singh*	**G6.02** The DC Force Exerted on a Charged Microparticle by an AC Electric Field *D. Prieve, C. Wirth, P. Sides*	**G6.03** Analysis of eletrectrohydrodynamic jetting using multifunctional and three-dimensional tomography *H. Ko, X. Nguyen, S. Lee, Y. Kim*	**G6.04** Electrokinetic filtration and separation of particles by size in single-spiral microchannels. *J. DuBose, N. Tupper, J. Stonaker, S. Patel, X. Xuan*	**G6.05** Ion correlation and ion steric effects on electrophoresis of a colloidal particle *R. Stout, A. Khair*	**G6.06** Frequency dispersion in dipolophoresis of metallodielectric Janus spheres *A. Boymelgreen, G. Yossifon, T. Miloh*
G7. Microfluids: Electro/Magnetic Manipulation Room: 329 Chair: P. Arratia, U. of Pennsylvania	**G7.01** Electrical manipulation of submicron particles by reservoir-based dielectrophoresis (rDEP). *H. Harrison, M. Johnson, S. Patel, X. Xuan*	**G7.02** Self-assembly and manipulation of particles on drop surfaces *M. Janjua, I. Fischer, P. Singh*	**G7.03** Mathematical modeling of the motion of soft biological particles during insulator based dielectrophoresis *N. Dingari, C. Buie*	**G7.04** Electric filed induced self-assembly of monolayers of sub-micron sized particles on flexible thin films *K. Shah, M. Hossain, M. Janjua, N. Aubry, I. Fischer, P. Singh*	**G7.05** Electrical trapping and sorting of particles in an asymmetric ratchet microchannel *A. Kale, X. Lu, X. Xuan*	**G7.06** Transport of microspheres across liquid-liquid interfaces *S. Hardt, A. Sinha, A. Mollah, R. Ganguly*
G8. Particle-Laden Flows IV: General Topics Room: 330 Chair: D. V. Papavassiliou, U. of Oklahoma	**G8.01** Effects of near-wall turbulence structure on particles of different Schmidt number *Q. Nguyen, C. Srinivasan, D. Papavassiliou*	**G8.02** Hydrodynamic forces between colliding spheres during mechanical contact *J. Simeonov*	**G8.03** Eulerian-Lagrangian large eddy simulations of dense liquid-solid slurry flow through a horizontal pipe *S. Arolla, J. Capecelatro, O. Desjardins*	**G8.04** Decoupling the effects of the streamline curvature and the vorticity on the hydrodynamic forces acting on a spherical particle in rotating flows *T. Fukada, S. Takeuchi, T. Kajishima*	**G8.05** Particle interaction in oscillatory Couette and Poiseuille flows *N. Fathi, M. Ingber, P. Vorobieff*	**G8.06** On the simulation of turbulent particle-laden flow subject to radiation: Comparison between Eulerian and Lagrangian approaches *A. Vie, H. Pouransari, R. Zamansky, A. Mani*
G9. Instability: Interfacial and Thin-Film III Room: 333 Chair: P. Steen, Cornell U.	**G9.01** Dynamics of a thin ferrofluid film subjected to a magnetic field *D. Conroy, A. Wray, O. Matar*	**G9.02** Transition to disorder: the effects of elasticity on thin film flow inside a tube *J. Olander, R. Camassa, G. Forest, H. Ogrosky*	**G9.03** Laminar flow over a thin film *T. Ward, P. Troupe*	**G9.04** Buckling of a thin, viscous film in an axisymmetric geometry *M. Flynn, S. Bhattacharya, R. Craster*	**G9.05** Vortices catapult droplets in atomization *J. John Soundar Jerome, S. Marty, J. Matas, S. Zaleski, J. Hoepffner*	**G9.06** Collapse Dynamics in Rotating Thin Films *S. Mukhopadhyay, J. Dijksman, R. Maclaughlin, R. Camassa, R. Behringer*

Monday Morning, 25 November 2013						
Session	**08:00**	**08:13**	**08:26**	**08:39**	**08:52**	**09:05**
G10. Instability: Wakes I - Cylindrical Objects Room: 334 Chair: P. Fontana, Seattle U.	**G10.01** Cylinder wakes in quasi-two-dimensional flows with surface friction I: instability and scaling *J. Shim, J. Li, D. Raschko, P. Fontana*	**G10.02** Cylinder wakes in quasi-two-dimensional flows with surface friction II: effects of film thickness *J. Li, J. Shim, P. Fontana*	**G10.03** An iterative methodology for the computation of perturbation fields induced by harmonic forcing of the linearised Navier-Stokes equations in complex geometries and application to forced cylinder wakes *G. Papadakis, L. Lu*	**G10.04** A Zoology of unstable modes in a stratified cylinder wake *M. Bosco, P. Meunier*	**G10.05** Towards the estimation of the near-wake response to a single large-scale surface protrusion *T. Aydin, A. Ekmekci*	**G10.06** Stability of Flow around a Cylinder in Plane Poiseuille Flow *H. Dou, A. Ben*
G11. Bubbles IV: Growth, Heat Transfer and Boiling Room: 335 Chair: D. Brutin, Polytech Marseille/Centre de la Recherche	**G11.01** Electrolytic Bubble Growth on Pillared Arrays *K. Lee, O. Savas*	**G11.02** How do bubbles grow in a weakly supersaturated solution? *O. Enriquez, C. Sun, D. Lohse, A. Prosperetti, D. van der Meer*	**G11.03** Mixing and drift by air bubbles crossing an interface of a stratified medium *L. Diaz-Damacillo, A. Ruiz-Angulo, R. Zenit*	**G11.04** Effects of wakes and surface contamination on instantaneous mass transfer from a bubble to the surrounding liquid *Y. Nobata, T. Saito*	**G11.05** Using Improved Equation of State to Model Simultaneous Nucleation and Bubble Growth in Thermoplastic Foams *I. Khan, S. Costeux, D. Adrian, D. Cristancho*	**G11.06** Asymmetric interface temperature during vapor bubble growth *A. Diana, M. Castillo, T. Steinberg, D. Brutin*
G12. Vortex Dynamics and Vortex Flows IV Room: 336 Chair: M. Green, Syracuse U.	**G12.01** Investigating three-dimensional wake topology of a low aspect ratio dual step cylinder with 2D PIV measurements *C. Morton, S. Yarusevych*	**G12.02** Numerical investigation of vortex shedding behind a square cylinder oscillating in a closed channel *J. Pitre, J. Bull*	**G12.03** A Lagrangian Coherent Structures Analysis of the Unsteady Wake Behind a Circular Cylinder *M. Rockwood, J. Morrida, M. Green*	**G12.04** Investigating wake topology of a single step cylinder with tomographic PIV *S. Yarusevych, S. Rafati, F. Scarano*	**G12.05** The turbulent wake of a submarine model at varying pitch and yaw angle *A. Ashok, T. Van Buren, A. Smits*	**G12.06** Shedding characteristics along the span in the wake of a low-aspect-ratio pyramid *Z. Hosseini, M. El Hassan, R. Martinuzzi*
G13. Vortex Dynamics and Vortex Flows V Room: 301 Chair: A. Lang, U. of Alabama	**G13.01** Unsteadiness of Flow Structure on Low Swept Delta Wing *M. Zharfa, I. Ozturk, M. Yavuz*	**G13.02** Flow Structure over Moderate Swept Delta Wing: Effects of Reynolds Number and Attack Angle *I. Ozturk, M. Zharfa, M. Yavuz*	**G13.03** Vorticity Transport in the Leading Edge Vortex of a Plunging Airfoil *A. Eslam Panah, J. Akkala, J. Buchholz*	**G13.04** Effect of cavitation on flow structure of a tip vortex *D. Matthieu, M. Reclari, M. Farhat*	**G13.05** Three Dimensional Vortex Wake Structure of Flapping Wings in Hovering Flight *B. Cheng, Y. Liu, X. Deng*	**G13.06** Volumetric visualization of the near and far field wake in flapping wings *Y. Liu, B. Cheng, X. Deng*
G14. Experimental Techniques IV: PIV - Uncertainty/Microscopic Room: 302 Chair: P. Vlachos, Virginia Polytechnic Institute and State U.	**G14.01** Uncertainty estimation for Stereo-Particle Image Velocimetry measurements *S. Bhattacharya, B. Meyers, M. Giarra, R. La Foy, P. Vlacjos*	**G14.02** Evaluation of multi-pulse PIV for spatial resolution, velocity accuracy and acceleration measurement *L. Ding, R. Adrian, S. Gogineni, K. Prestridge*	**G14.03** 3 Component PIV Uncertainty *S. Warner, B. Smith*	**G14.04** Effects of Spatial Alignment in Stereo Particle Image Velocimetry *B. Smith, S. Beresh*	**G14.05** Correlation plane statistical analysis for estimation of measurement uncertainty for Particle Image Velocimetry *Z. Xue, J. Charonoko, P. Vlachos*	**G14.06** Nano-scale velocimetry with Bessel Beam Microscopy *C. Snoeyink*
G16. Biofluids: Physiological V - Respiratory System Flows Room: 304 Chair: B. A. Craven, Pennsylvania State U.	**G16.01** On locating the obstruction in the human upper airway *Y. Wang, S. Elghobashi*	**G16.02** A fully resolved fluid-structure-muscle-activation model for esophageal transport *W. Kou, A. Bhalla, B. Griffith, M. Johnson, N. Patankar*	**G16.03** Effect of Time-dependent Pressure Boundary Condition on Flow Transport in a Patient Specific Lung Model during Invasive High Frequency Oscillatory Ventilation *M. Alzahrany, A. Banerjee*	**G16.04** Effect of morphological variability on particle deposition in idealized human airways *E. Lin, J. Bernate, D. Parada San Martin, Y. Makitani, E. Shaqfeh, G. Iaccarino*	**G16.05** Renal hemodynamics: the influence of the renal artery ostium flow diverter *J. Rossmann, S. Albert, R. Balaban*	**G16.06** Simulation of the flow field and particle deposition in a realistic geometry of the human airways *J. Bernate, E. Lin, E. Shaqfeh, G. Iaccarino*
G17. Biofluids: Locomotion IV - Liquids; Experiments and Numerical Simulations Room: 305 Chair: K. Moored, Lehigh U.	**G17.01** Quantitative analysis of fish wake dynamics using volumetric PIV data *L. Mendelson, A. Techet*	**G17.02** On the effect of flexibility on the performance of a bio-inspired fin *S. Chiazza, F. Bremer, A. Smits*	**G17.03** Force Measurements of a varying camber hydrofoil *D. Najdzin, P. Bardet, M. Leftwich*	**G17.04** Scaling the hydrodynamic performance of heaving flexible panels *D. Quinn, G. Lauder, A. Smits*	**G17.05** Lift enhancement by spanwise oscillation in forward translation of a rectangular wing at low Reynolds number *S. Wang, X. Zhang, G. He*	**G17.06** Hydrodynamics of foils swimming in a side-by-side configuration *P. Dewey, K. Moored, D. Quinn, A. Smits*
G18. Biofluids: Locomotion V - Swimming Experiments Room: 306/307 Chair: H. Haj-Hariri, U. of Virginia	**G18.01** Flying fish accelerate at 5 G to leap from the water surface *P. Yang, S. Phonekeo, K. Xu, S. Chang, D. Hu*	**G18.02** Flexibility increases lift on passive fluttering wings *D. Tam, J. Bush*	**G18.03** Synthetic C-start maneuver in fish-like swimming *R. Zenit, R. Godoy-Diana*	**G18.04** The swimming mechanics of Artemia Salina *A. Ruiz-Angulo, A. Ramos-Musalem, R. Zenit*	**G18.05** Fluid elasticity enhances the locomotion of multi-tail swimmers *F. Godinez, S. Gomez, R. Zenit, E. Lauga*	**G18.06** High Speed Tomographic PIV Measurements of Copepod Sensitivity to a Suction-Feeding Predator Mimic *J. Yen, D. Murphy, L. Fan, A. Skipper, D. Webster*
G19. Biofluids: Cellular II - Experimental Studies Room: 310/311 Chair: J. Carlos Del Alamo, U. of California, San Diego	**G19.01** Mechanical Response of Red Blood Cells Entering a Constriction *N. Zeng, W. Ristenpart*	**G19.02** Effect of Varying Fluid Shear Stress on Cancer Stem Cell Viability & Protein Expression *R. Domier, Y. Kim, D. Dozier, U. Triantafillu*	**G19.03** Lower limit of shear to induce 2-D protein crystals *J. Young, D. Posada, A. Hirsa, J. Lopez*	**G19.04** Are endothelial cell bioeffects from acoustic droplet vaporization proximity dependent? *R. Seda, D. Li, J. Fowlkes, J. Bull*	**G19.05** Fabrication of hydrogel substrates with stiffness step variations using controlled surface wettability *M. Rahman, D. Lee, S. Ryu*	**G19.06** Turbulent unmixing: how marine turbulence drives patchy distributions of motile phytoplankton *W. Durham, E. Climent, M. Barry, F. De Lillo, G. Boffetta, M. Cencini, R. Stocker*

Monday Morning, 25 November 2013						
Session	**08:00**	**08:13**	**08:26**	**08:39**	**08:52**	**09:05**
G20. Boundary Layers V: Compressible and Thermal Room: 315 Chair: F. Mashayek, U. of Illinois at Chicago	**G20.01** A quantitative theory for the mean velocity distribution of compressible ramp flow *W. Bi, B. Wu, H. Zou, X. Li, F. Hussain, Z. She*	**G20.02** Turbulence Structure and Wall Signature in Hypersonic Boundary Layer *Y. Kan, P. Martin*	**G20.03** Thermal boundary condition effects on compressible turbulent boundary layers *I. Beekman, P. Martin*	**G20.04** Interaction of a Mach 2.25 turbulent boundary layer with a fluttering panel using direct numerical simulation *D. Bodony, C. Ostoich, P. Geubelle*	**G20.05** Acoustic Radiation from High-Speed Turbulent Boundary Layers *L. Duan, M. Choudhari*	**G20.06** Effects of radiation in turbulent boundary layers: Analysis of the mean temperature profile *R. Vicquelin, Y. Zhang, O. Gicquel, J. Taine*
G21. Turbulence: Simulations III - DNS and LES II Room: 316 Chair: R. Moser, U. of Texas	**G21.01** Progress and opportunities in direct numerical simulations at the next higher resolution *P. Yeung, K. Sreenivasan*	**G21.02** Backward tracking for the study of turbulent dispersion in direct numerical simulations over a range of Reynolds numbers *D. Buaria, P. Yeung, B. Sawford*	**G21.03** A Web-Services accessible database for channel flow turbulence at Re_τ=1000 *J. Graham, K. Kanov, E. Givelberg, R. Burns, G. Eyink, A. Szalay, C. Meneveau, M. Lee, N. Malaya, R. Moser*	**G21.04** Estimating Uncertainties in Statistics Computed from DNS *N. Malaya, T. Oliver, R. Ulerich, R. Moser*	**G21.05** Direct numerical simulation for incompressible channel flow at $Re_\tau = 5200$ *M. Lee, N. Malaya, R. Moser*	**G21.06** LES of radial wall jets over smooth and rough surfaces *R. Banyassady, U. Piomelli*
G22. Turbulent Mixing I: Scalar Mixing Room: 317 Chair: R. Fox, Iowa State U.	**G22.01** Measurements of the relative diffusion of a passive scalar plume in sheared turbulence *C. Vanderwel, S. Tavoularis*	**G22.02** Endwall Vortex Effects on Turbulent Dispersion of Film Coolant in a Turbine Vane Cascade *S. Yapa, C. Elkins, J. Eaton*	**G22.03** Transfer of passive scalar variance in decaying grid turbulence with a mean scalar gradient *L. Danaila, L. Mydlarski*	**G22.04** Turbulent transport and mixing of a passive scalar in a confined liquid wake *J. Hill, K. Nilsen, B. Kong, R. Fox, M. Olsen*	**G22.05** Statistical Investigation of Turbulent Mixing by Means of Turbulent Line Segments *M. Gauding, N. Peters*	**G22.06** Turbulent generation of scalar covariance between two initially distant scalars: implications for enhanced mixing and reaction *M. Soltys, F. Shoaei, J. Crimaldi*
G23. Turbulence: Theory IV - Modeling and Simulation Room: 318 Chair: W. K. George, Princeton U.	**G23.01** On Intense Vortex Structures in Isotropic Turbulence *A. Leonard*	**G23.02** Self-sustaining turbulence in a Restricted Nonlinear (RNL) Model of plane Couette flow *V. Thomas, D. Gayme, B. Farrell, P. Ioannou*	**G23.03** A minimal representation of turbulence in plane Couette flow *D. Gayme, V. Thomas, B. Farrell, P. Ioannou*	**G23.04** A "resonant" spanwise perturbation frequency in streamwise-constant Couette flow *I. Hameduddin, D. Gayme*	**G23.05** Exact coherent structures in 2D weakly turbulent flow *R. Grigoriev, R. Pallantla*	**G23.06** Universal Realizable Anisotropic Prestress (URAPS) Closure for the Reynolds Stress *C. Petty, K. Koppula, A. Benard*
G24. Aerodynamics II Room: 319 Chair: F. Scarano, TU Delft	**G24.01** Dynamic instability of small-scale wind turbine blades *P. Pourazarm, Y. Modarres-Sadeghi, M. Lackner*	**G24.02** Studies of Mini-Turbines *S. Chan, M. Endo, M. Romanko, C. Williamson*	**G24.03** Performance Optimization and Analysis of Variable-Pitch Vertical-Axis Wind Turbines *D. Rempfer, P. Kozak*	**G24.04** Fluid-Structure Interaction Simulations of a Parked Wind Turbine Rotor Blade under Steady and Unsteady Inflow Conditions *R. Campbell, B. Jayaraman, A. Lavely, J. Motta-Mena, G. Vijayakumar*	**G24.05** Proper Orthogonal Decomposition analysis of Large Eddy Simulation data of a single wind turbine wake with uniform inflow *C. VerHulst, R. Mikkelsen, J. Sorensen, C. Meneveau*	**G24.06** Evaluation of drag forcing models for vertical axis wind turbine farms *B. Pierce, P. Moin, J. Dabiri*
G25. Flow Control IV: Plasma Actuators Room: 320 Chair: N. Clemens, U. of Texas at Austin	**G25.01** Real-time control of the boundary layer disturbance induced by a dynamic isolated roughness element using plasma actuators *K. Bade, A. Naguib, R. Hanson, P. Lavoie, B. Belson, C. Rowley*	**G25.02** Transition delay by introducing spanwise velocity gradients *B. Fallenius, K. Barckmann, J. Fransson, S. Grundmann*	**G25.03** Effect of Pulsed Plasma Jets on Reflected Shock-Turbulent Boundary Layer Interaction *B. Greene, N. Clemens, P. Magari, D. Micka*	**G25.04** The Influence of Spanwise Segmented Plasma Actuator Forcing on a Circular Cylinder Wake and the Selection of Optimum Wavelength *S. Bhattacharya, J. Gregory*	**G25.05** Experimental Study of the Power Profile Airfoil Equipped with Plasma Flow Control *L. Daniel, J. Jacob*	**G25.06** Vane Separation Control in a Linear Cascade with Area Expansion using AC DBD Plasma Actuators *C. Kleven, T. Corke*
G26. Reacting Flows IV: PDF/FDF Room: 321 Chair: R. H. Sheikhi, Northeastern U.	**G26.01** PDF modeling of chemically reacting flows in a compression-ignition engine *V. Raj Mohan, D. Haworth, J. Li*	**G26.02** A Partially-Stirred Batch Reactor Model for Under-Ventilated Fire Dynamics *R. McDermott, C. Weinschenk*	**G26.03** Subfilter Modeling in Spray Combustion Using the Probability Density Function Approach *C. Heye, V. Raman*	**G26.04** Numerical simulations of turbulent jet ignition and combustion *A. Validi, A. Irannejad, F. Jaberi*	**G26.05** LES-Based Analysis of Entropy Generation in a Turbulent Nonpremixed Flame *M. Safari, R. Sheikhi*	**G26.06** FDF Simulation of the PRECCINSTA Burner *N. Ansari, G. Goldin, P. Strakey, P. Givi*
G28. Waves II Room: Spirit of Pittsburgh Ballroom B/C Chair: L. Chamorro, U. of Illinois at Urbana-Champaign	**G28.01** Scaling and kinematics of a floating wind turbine under ocean waves and variable thrust: an experimental study *C. Feist, K. Ruehl, M. Guala*	**G28.02** Fluid-structure interaction simulation of floating wind turbines interacting with complex, large-scale ocean waves *A. Calderer, X. Guo, L. Shen, F. Sotiropoulos*	**G28.03** Impact of plunging breaking waves on a partially submerged cube *A. Wang, C. Ikeda, J. Duncan*	**G28.04** Slamming pressures on the bottom of a free-falling vertical wedge *C. Ikeda, C. Judge*	**G28.05** Experimental investigation of the inception of a spilling breaker *D. Liberzon, L. Shemer*	**G28.06** Generation of surface waves by an underwater moving bottom: experiments and application to tsunami modeling *L. Gordillo, T. Jamin, G. Ruiz-Chavarría, M. Berhanu, E. Falcon*
G30. Instability: Rayleigh-Taylor I Room: 408 Chair: R. Narayanan, U. of Florida	**G30.01** Experiments on Effects of Initial Conditions and Material Strength on Rayleigh-Taylor Instability *P. Roach, A. Banerjee*	**G30.02** Mixed-mode instability of a miscible interface due to coupling between Rayleigh-Taylor and double-diffusive convective modes *J. Carballido-Landeira, P. Trevelyan, C. Almarcha, A. De Wit*	**G30.03** Buoyancy Driven Mixing By Microwave Volumetric Energy Deposition *A. Wachtor, V. Mocko, F. Jebrail, M. Andrews, R. Gore*	**G30.04** Miscible and immiscible experiments on the Rayleigh-Taylor instability using planar laser induced fluorescence visualization *M. Mokler, M. Roberts, J. Jacobs*	**G30.05** An analysis of the Rayleigh-Taylor instability of thin viscous layers *E. de la Calleja, S. Zetina, R. Zenit*	**G30.06** Rayleigh-Taylor instability under a curved substrate *H. Kim, N. Hammoud, H. Stone*

Monday Morning, 25 November 2013						
Session	**08:00**	**08:13**	**08:26**	**08:39**	**08:52**	**09:05**
G31. Porous Media Flows V: CO2 Sequestration Room: 402 Chair: A. Soldati, U. of Udine	**G31.01** Experimental investigation of the infiltration of liquid CO2 into water-saturated, two-dimensional porous micro-models using micro-PIV *F. Kazemifar, G. Blois, D. Kyritsis, K. Christensen*	**G31.02** Capillary pinning of immiscible gravity currents in porous media *B. Zhao, C. MacMinn, H. Huppert, R. Juanes*	**G31.03** Onset of nonlinear convection in transient diffusive boundary layers: application to CO_2 sequestration *N. Tilton, A. Riaz*	**G31.04** Dissolution patterns from geochemical reactions during Rayleigh-Benard convection in porous media *X. Fu, L. Cueto-Felgueroso, D. Bolster, R. Juanes*	**G31.05** Transient diffusive boundary layers in heterogeneous porous media *D. Daniel, A. Riaz*	**G31.06** Stability of High Rayleigh-Number Equilibrium Solutions of the Darcy–Oberbeck–Boussinesq Equations *B. Wen, L. Corson, G. Chini*
G32. Granular Flows I: Impact, Locomotion and Drag Room: 403 Chair: A. Winter, Massachusetts Institute of Technology	**G32.01** Impact response of shear thickening suspensions *E. Brown, O. Ozgen, M. Kallmann, B. Allen*	**G32.02** Impact in dense granular suspensions: crucial role of dilatancy and pore pressure feedback *Y. Forterre, J. Soundar Jerome, N. Vandenberghe, L. Duchemin*	**G32.03** Dimensional analysis scaling of impact craters in unconsolidated granular materials *D. Dowling, T. Dowling*	**G32.04** Drag reduction due to interstitial air in a granular medium *T. Homan, D. van der Meer*	**G32.05** The Mechanics of Localized Fluidization Burrowing *A. Winter*	**G32.06** Reversibility in locomotion in granular media *W. Savoie, D. Goldman*
G33. Drops VII: Wetting and Spreading Room: 404 Chair: A. Sauret, Princeton U.	**G33.01** Shapes of non-circular drops on inclined hysteretic surfaces *N. Janardan, M. Panchagnula*	**G33.02** Liquid spreading in the partial wetting regime *A. Pahlavan, M. Chen, L. Cueto-Felgueroso, G. McKinley, R. Juanes*	**G33.03** Drag on Sessile Drops *A. Milne, B. Fleck, D. Nobes, D. Sen, A. Amirfazli*	**G33.04** Liquid Droplet Dynamics Placed on a Thin Liquid Film *V. Kulkarni, A. Mishra, J. Khor, S. Wereley*	**G33.05** Static and Dynamic Contact Angles of Immersed Ferrofluid Droplets *S. Chatterjee, D. Bhowmik, A. Mukhopadhyay, R. Ganguly*	**G33.06** Volume-filtered Surface Forces for the Simulation of Contact Lines *G. Della Rocca, G. Blanquart*
G34. Drops VIII: Fragmentation Room: 405 Chair: N. Priezjev, Michigan State U.	**G34.01** Explosive fragmentation *A. Vledouts, J. Graña-Otero, J. Quinard, N. Vandenberghe, E. Villermaux*	**G34.02** Drop Size Distributions of Aerated Liquid Jets injected in Subsonic Crossflow *A. Adebayo, K. Sallam, K. Lin, C. Carter*	**G34.03** An ultrasonic scrubber: enhanced removal of particles by water sprays via ultrasonic excitation *J. Saylor, W. Ran, R. Holt*	**G34.04** Atomization in Sparkling Fireworks *C. Inoue, M. Koshi, H. Terashima, T. Himeno, T. Watanabe*	**G34.05** Free-fall of Water Drops Generated in the Laboratory for Rainfall Simulations *F. Testik, N. Chowdhury, M. Hornack, A. Khan*	**G34.06** Interfacial Instabilities on a Droplet *M. Jalaal, K. Mehravaran*
G35. Chaos, Fractals, and Dynamical Systems I: Coherent Structures Room: 406 Chair: S. Shadden, U. of California, Berkeley	**G35.01** Lagrangian Coherent Structures and their application to ocean transport *T. Peacock, M. Allshouse*	**G35.02** Coherent structures in reacting flows *J. Mahoney, K. Mitchell*	**G35.03** An extension of shear and strain LCS concepts to higher dimensions *S. Ameli, S. Shadden*	**G35.04** Lagrangian Descriptors: A Method for Revealing Phase Space Structures of General Time Dependent Dynamical Systems *A. Mancho, S. Wiggins, J. Curbelo, C. Mendoza*	**G35.05** Experimental Three Dimensional Lagrangian Coherent Structures of Inertial Particles in Flows *S. Raben, S. Ross, P. Vlachos*	**G35.06** Inertial particle dynamics: Coherent structures in the presence of the Basset–Boussinesq memory term *M. Farazmand, G. Haller*
G36. Microfluids: Drops/Bubbles Room: 407 Chair: T. Lee, City College of New York	**G36.01** A co-flow-focusing monodisperse microbubble generator *J. Zhang, E. Li, S. Sigurdur*	**G36.02** Critical behavior of droplet breakup in T-junction microchannels *V. van Steijn, D. Hoang, L. Portela, C. Kleijn, M. Kreutzer*	**G36.03** Controlled generation of high inertial gas-liquid droplet microflows in flow focusing geometries *A. Shahriari, M. Kim, S. Zamani, N. Phillip, C. Hidrovo*	**G36.04** Tipstreaming from the rear of surfactant laden droplets traveling through a microchannel *T. Moyle, L. Walker, S. Anna*	**G36.05** Gas bubble formation and its pressure signature in T-junction of a microreactor *S. Pouya, M. Koochesfahani*	**G36.06** Early microfluidic dissolution regime of CO_2 bubbles in viscous oils *M. Sauzade, T. Cubaud*

Monday Morning, 25 November 2013					
Session	**09:18**	**09:31**	**09:44**	**09:57**	**10:10**
G1. Geophysical: Oceanographic IV Room: 323 Chair: M. Paoletti, U. of Texas at Austin	**G1.07** Determination of internal wave energy fluxes without pressure *F. Lee, M. Paoletti, H. Swinney, P. Morrison*	**G1.08** Effect on Ex on internal waves created by tidal flow over near-critical topographic features *M. Jalali B., N. R. Rapaka, S. Sarkar*	**G1.09** Energy Flux of Transmitted and Reflected Internal Waves *P. Kurtakoti, J. Munroe*	**G1.10** Subharmonic instability of locally confined internal wave beams *H. Karimi, T. Akylas*	**Refreshment Break**, 10:10–10:30 Exhibit Hall A
G2. Convection and Buoyancy-Driven Flows IV: Rayleigh-Benard Convection Room: 324 Chair: R. Stevens, Johns Hopkins U.	**G2.07** Size-Dependent Rayleigh–Bénard Problem *A. Hajesfandiari, A. Hadjesfandiari, G. Dargush*	**G2.08** Boiling Rayleigh-Benard flow *D. Narezo, Y. Xie, G. Ahlers, C. Sun, D. Lohse*	**G2.09** Periodic mode competition in Rayleigh-Benard convections with a horizontal magnetic field *Y. Tasaka, K. Igaki, T. Yanagisawa, S. Eckert*	**G2.10** Torsional oscillation of the large-scale circulation in turbulent Rayleigh-Bénard convection at large Rayleigh numbers *D. van Gils, X. He, G. Ahlers, E. Bodenschatz*	
G3. Multiphase Flows IV Room: 325 Chair: S. Garrick, U. of Minnesota	**G3.07** Analysis of Liquid Jet in Cross-flow Atomization Using Validated High Fidelity Simulation *M. Soteriou, X. Li*	**G3.08** Large Scale Behavior and Droplet Size Distributions in Crude Oil Jets and Plumes *J. Katz, D. Murphy, D. Morra*	**G3.09** Experimental and computational investigation of underwater buoyant oil jets *L. Berard, M. Raessi, M. Bauer, P. Friedman, S. Codyer*		
G4. Separated Flows I: Diffusers and Massively Separated Flows Room: 326 Chair: D. You, Carnegie Mellon U.	**G4.07** Flow over a backward-facing step: Mean separation bubble and evolution of coherent structures *P. Nadge, R. Govardhan*	**G4.08** Data Reduction Methods to Identify Characteristic Scales in Transient, Inhomogeneous Flows *J. Dantonio, J. Cameron, S. Morris*			
G5. CFD IV Room: 327 Chair: S. Levent Yilmaz, MathWorks	**G5.07** Asynchronous schemes for CFD at extreme scales *A. Konduri, D. Donzis*	**G5.08** A Parallel Hexahedral Unstructured Adaptive Mesh Refinement Library *C. Ballesteros, M. Herrmann*	**G5.09** Parallel Cartesian grid refinement for 3D complex flow simulations *D. Angelidis, F. Sotiropoulos*	**G5.10** Domain decomposition for coupled Stokes and Darcy flows with floating Stokes domains *C. Wang, I. Yotov*	
G6. Microfluids: Particles II - Electrokinetically Induced Flow Room: 328 Chair: G. Drazer, Rutgers U.	**G6.07** Bifurcation in the equililbrium height of colloidal particles over an electrode in low frequency electric fields *T. Woehl, C. Dutcher, N. Talken, B. Chen, W. Ristenpart*	**G6.08** Nonlinear electrophoresis of ideally polarizable particles *B. Figliuzzi, W. Chan, C. Buie*	**G6.09** Thermal dielectrophoretic force on a dielectric particle *B. Shaparenko, H. Hu, H. Bau*	**G6.10** Deterministic separation of particles by electrophoresis: e-DLD *S. Hanasoge, R. Devendra, F. Diez, G. Drazer*	
G7. Microfluids: Electro/Magnetic Manipulation Room: 329 Chair: P. Arratia, U. of Pennsylvania	**G7.07** Self-assembled magnetocapillary swimmers *M. Hubert, G. Lumay, F. Weyer, N. Obara, N. Vandewalle*	**G7.08** Structure and dynamics of self-assembling colloidal monolayers in oscillating magnetic fields *A. Koser, P. Arratia*	**G7.09** Models of particle capture in high gradient magnetic separation *A. Eisentraeger, I. Griffiths, D. Vella*		
G8. Particle-Laden Flows IV: General Topics Room: 330 Chair: D. V. Papavassiliou, U. of Oklahoma	**G8.07** Radiative heating of a turbulent particle-laden flow: Effects of radiation regimes on turbulence dynamics *A. Frankel, H. Pouransari, G. Iaccarino, A. Mani*	**G8.08** Characterization of the temporal evolution of the particle clustering in radiation-induced turbulence *R. Zamansky, A. Mani*	**G8.09** A low-Mach approximation computational framework for particle-laden flows subject to radiation *H. Pouransari, R. Zamansky, A. Mani*	**G8.10** Large-Eddy Simulation of Particle Dispersion Inside and Above Plant Canopies *Y. Pan, M. Chamecki, S. Isard*	
G9. Instability: Interfacial and Thin-Film III Room: 333 Chair: P. Steen, Cornell U.	**G9.07** Dynamic Thinning of Non-Newtonian Films measured with LED-LIF *H. von Seggern, A. Vorreiter, J. Seume*	**G9.08** Wrinkling of Thin Films Induced by Viscous Stress *S. Chatterjee, C. Mcdonald, J. Niu, R. Huang, S. Velankar*	**G9.09** Meniscus stability in the planar-flow melt spinning of thin metallic sheets *A. Altieri, P. Steen*	**G9.10** Experimental investigation of the stability of a moving radial liquid sheet *M. Paramati, M. Tirumkudulu*	

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Session	**09:18**	**09:31**	**09:44**	**09:57**	**10:10**
G10. Instability: Wakes I - Cylindrical Objects Room: 334 Chair: P. Fontana, Seattle U.	**G10.07** Too big to grow: the saturation mechanism of the von Karman vortex street captured by a self-consistent model *V. Mantic-Lugo, C. Arratia, F. Gallaire*	**G10.08** Investigation of the effect of the spanwise forcing on vortex shedding suppression in the flow past a cylinder *G. Rocco, S. Sherwin*	**G10.09** The Wake Analysis Behind a Foamed Cylinder *A. Khashechi*		**Refreshment Break**, 10:10–10:30 Exhibit Hall A
G11. Bubbles IV: Growth, Heat Transfer and Boiling Room: 335 Chair: D. Brutin, Polytech Marseille/Centre de la Recherche	**G11.07** Single Bubble Dynamics on Superhydrophilic Micropillar Arrays during Flow Boiling *J. Feng, S. Chen, T. Zhang, E. Wang*	**G11.08** Dual-Luminescent Imaging for Capturing Temperature Field around a Bubble *H. Sakaue, H. Goya, T. Miyazaki*	**G11.09** Heat transfer in turbulent bubbly flow in channels *S. Dabiri, G. Tryggvason*	**G11.10** Multi-Scale Acoustic Actuation of Vapor Bubbles for Pool Boiling Enhancement *T. Boziuk, M. Smith, A. Glezer*	
G12. Vortex Dynamics and Vortex Flows IV Room: 336 Chair: M. Green, Syracuse U.	**G12.07** Vortices Behind Asymmetric Bodies Forming Closed Wakes *A. Elcrat, K. Miller, L. Zannetti*	**G12.08** Circulation shedding in viscous starting flow past a flat plate *M. Nitsche, L. Xu*	**G12.09** Pressure-gradient Mechanism for Vortex Shedding in External Flows *M. Boghosian, K. Cassel*	**G12.10** The Interplay of Acceleration and Vorticity Fields in the Tip Region of Massively-Separated Flows *D. Rival, J. Kriegseis*	
G13. Vortex Dynamics and Vortex Flows V Room: 301 Chair: A. Lang, U. of Alabama	**G13.07** Influence of wing tip morphology on vortex dynamics of flapping flight *S. Krishna, K. Mulleners*	**G13.08** Vortex shedding in flow past an airfoil using boundary layer approximation *X. Guo, S. Mandre*	**G13.09** Performance of Piezoelectric Energy Harvesters in Isotropic Turbulence *A. Danesh-Yazdi, O. Goushcha, N. Elvin, Y. Andreopoulos*		
G14. Experimental Techniques IV: PIV - Uncertainty/Microscopic Room: 302 Chair: P. Vlachos, Virginia Polytechnic Institute and State U.	**G14.07** Development of real time digital holographic microscope for cell flow interactions using a High Performance Computing (HPC) cluster *A. Hojjati, M. Molaei, J. Sheng*	**G14.08** Real and virtual image separation in digital in-line holography microscopy by recording two parallel holograms *H. Ling, J. Katz*	**G14.09** Turbulent Boundary Layer Facility to Investigate Superhydrophobic Drag Reduction *J. Gose, M. Perlin, S. Ceccio*	**G14.10** Echo Particle Image Velocimetry Measurements of Liquified Biomass *N. DeMarchi, C. White*	
G16. Biofluids: Physiological V - Respiratory System Flows Room: 304 Chair: B. A. Craven, Pennsylvania State U.	**G16.07** An image-based automatic mesh generation and numerical simulation for a population-based analysis of aerosol delivery in the human lungs *S. Miyawaki, M. Tawhai, E. Hoffman, C. Lin*	**G16.08** Modeling Nanoparticle Transport and Distribution in Lung Vasculature *Y. Liu, J. Zheng*	**G16.09** A Comparative Study of Airflow and Odorant Deposition in the Mammalian Nasal Cavity *J. Richter, C. Rumple, A. Ranslow, A. Quigley, B. Pang, T. Neuberger, M. Krane, B. Van Valkenburgh, B. Craven*	**G16.10** Convective-diffusive particle transport in pulmonary acinar models *P. Hofemeier, J. Sznitman*	
G17. Biofluids: Locomotion IV - Liquids; Experiments and Numerical Simulations Room: 305 Chair: K. Moored, Lehigh U.	**G17.07** Mimicking fish-like kinematics using fluid-structure interactions *B. Thiria, S. Ramananarivo, R. Godoy-Diana*	**G17.08** Dynamically Coupled Fluid-Body Interactions with a Versatile Multi-Domain Immersed Boundary Library *C. Wang, J. Eldredge*	**G17.09** Clear Delineation of Added-Mass and Vortex- Induced Forces Generated by Flapping Wing *C. Zhang, T. Hedrick, R. Mittal*	**G17.10** Drag on swimming flexible foils *V. Raspa, S. Ramananarivo, B. Thiria, R. Godoy-Diana*	
G18. Biofluids: Locomotion V - Swimming Experiments Room: 306/307 Chair: H. Haj-Hariri, U. of Virginia	**G18.07** Thin Layer Sensory Cues Affect Antarctic Krill Swimming Kinematics *A. True, D. Webster, M. Weissburg, J. Yen*	**G18.08** Quantifying copepod sensing and swimming in unsteady flow fields using time-resolved tomographic PIV + 3D PTV *D. Adhikari, E. Longmire*	**G18.09** Investigating the relationship between planform and performance in bio-inspired aquatic propulsion *O. Badaoui, D. Quinn, P. Dewey, A. Smits*	**G18.10** Free swimming of an internally actuated elastic swimmer *P. Yeh, A. Erturk, A. Alexeev*	
G19. Biofluids: Cellular II - Experimental Studies Room: 310/311 Chair: J. Carlos Del Alamo, U. of California, San Diego	**G19.07** Getting into the flow: Red cells go on a roll, two-component vesicles swing *A. Viallat, J. Dupire, K. Khelloufi, A. Al Halifa*	**G19.08** Platelet transport in microchannels *M. Reyssat, A. Le Goff, A. Blin, J. Pujos, A. Magniez, D. Baruch*	**G19.09** Characterization of Intracellular Streaming and Traction Forces in Migrating Physarum Plasmodia *S. Zhang, R. Meili, R. Guy, J. Lasheras, J. del Alamo*		

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Session	**09:18**	**09:31**	**09:44**	**09:57**	**10:10**
G20. Boundary Layers V: Compressible and Thermal Room: 315 Chair: F. Mashayek, U. of Illinois at Chicago	**G20.07** A wall model for LES accounting for radiation effects *R. Vicquelin, Y. Zhang, O. Gicquel, J. Taine*	**G20.08** Experimental investigation of thermally stable turbulent boundary layers *A. Smits, O. Williams, T. Hohman, T. van Buren*	**G20.09** Turbulent thermal boundary layers subjected to severe acceleration *G. Araya, L. Castillo*	**G20.10** Effects of radiation in turbulent boundary layers: Analysis of temperature fluctuations and turbulent transport *R. Vicquelin, Y. Zhang, O. Gicquel, J. Taine*	**Refreshment Break**, 10:10–10:30 Exhibit Hall A
G21. Turbulence: Simulations III - DNS and LES II Room: 316 Chair: R. Moser, U. of Texas	**G21.07** Large-eddy simulation of turbulent dispersion from a localized source in a build-up environment *B. Wang, M. Saeedi*	**G21.08** Analysis of effective eddy viscosity in DNS results of stratified turbulence *S. Khani, M. Waite*	**G21.09** An accurate and efficient Lagrangian subgrid model for turbulent dispersion *A. Lanotte, I. Mazzitelli, F. toschi*	**G21.10** The k^{-2} spectrum in decaying magnetohydrodynamic turbulence *V. Dallas, A. Alexakis*	
G22. Turbulent Mixing I: Scalar Mixing Room: 317 Chair: R. Fox, Iowa State U.	**G22.07** Statistical and Visual Analysis of Conserved Scalar Mixing Dynamics in Turbulent Jets Using kHz-Rate Imaging *M. Papageorge, F. Fuest, J. Sutton*	**G22.08** How a scalar puff that is written in turbulence disperses: theory and experiment *W. van de Water, E. Calzavarini, M. Mirzaei, B. Eckhardt, F. Toschi, N. Dam*	**G22.09** On the interaction of two scalar plumes in a turbulent flow *B. Wang, S. Oskouie, E. Yee*		
G23. Turbulence: Theory IV - Modeling and Simulation Room: 318 Chair: W. K. George, Princeton U.	**G23.07** Simultaneous large-scale and sub-grid scale PIV measurements in a turbulent shear flow *O. Buxton, B. Ganapathisubramani*	**G23.08** Turbulence in Taylor-Couette Flow and a Molecule Dependent Transport Equation *L. Bo-ot, L. Jirkovsky*	**G23.09** Temporal decorrelations in compressible isotropic turbulence *G. He, X. Zhang, D. Li*	**G23.10** Energy extraction from a "thermalized tail" in the inviscid truncated system of isotropic turbulence *R. Rubinstein*	
G24. Aerodynamics II Room: 319 Chair: F. Scarano, TU Delft	**G24.07** Large eddy simulations of vertical axis wind turbines to optimize farm design *S. Hezaveh, E. Bou-Zeid*	**G24.08** Numerical study of ocean wave effect on offshore wind farm *L. Shen, D. Yang, C. Meneveau*	**G24.09** Power Optimization of Wind Farms in Large Eddy Simulations *J. Meyers, J. Goit*		
G25. Flow Control IV: Plasma Actuators Room: 320 Chair: N. Clemens, U. of Texas at Austin	**G25.07** An Investigation of Plasma Actuators for Flow Control in a 140° Bend *M. Arthur, T. Corke, T. Samper*	**G25.08** DBD Control of a Turbulent Shear Layer downstream of a Backward Facing Step *P. Sujar-Garrido, N. Benard, E. Moreau, J. Bonnet*	**G25.09** Active Control of Natural Tollmien-Schlichting Waves using Plasma Actuators *M. Kotsonis, R. Krishan Shukla, S. Probsting*	**G25.10** Suppression or Enhancement of Pressure Fluctuations in High Subsonic Cavity Flow Using Plasma Actuators *M. Samimy, K. Yugulis, S. Hansford, J. Gregory*	
G26. Reacting Flows IV: PDF/FDF Room: 321 Chair: R. H. Sheikhi, Northeastern U.	**G26.07** Parametric modeling studies of turbulent non-premixed jet flames with thin reaction zones *H. Wang*	**G26.08** Large Eddy Simulation / Filtered Mass Density Function Modeling of High Pressure Turbulent Hydrogen Flames *R. Miller, Z. Ma*	**G26.09** A New LES/PDF Method for Computational Modeling of Turbulent Reacting Flows *H. Turkeri, M. Muradoglu, S. Pope*	**G26.10** A New Hybrid FV/Particle Algorithm for PDF Simulations of Turbulent Reacting Flows *R. Mokhtarpoor, M. Muradoglu*	
G28. Waves II Room: Spirit of Pittsburgh Ballroom B/C Chair: L. Chamorro, U. of Illinois at Urbana-Champaign	**G28.07** Measurements of turbulence in the airflow above surface waves *F. Veron, M. Buckley*	**G28.08** Impact of Sea Spray on Air-Sea Fluxes *F. Veron, J. Mueller*	**G28.09** Eulerian and Lagrangian effects of surface wave on turbulence underneath *X. Guo, L. Shen*	**G28.10** Breaking of waves in deep water *G. Ruiz-Chavarria*	
G30. Instability: Rayleigh-Taylor I Room: 408 Chair: R. Narayanan, U. of Florida	**G30.07** Experimental measurements of velocity and density statistics in Rayleigh-Taylor instability at High Atwood numbers *D. Ranjan, B. Akula, T. Finn*	**G30.08** Experimental investigation of combined Rayleigh-Taylor instability and Kelvin-Helmholtz instability at different Atwood numbers *B. Akula, T. Finn, M. Andrews, D. Ranjan*	**G30.09** Efficient mixing in stratified flows: Rayleigh-Taylor instability within a stable stratification, experiments and computation *M. Davies Wykes, A. Lawrie, S. Dalziel*	**G30.10** Experiments on the expansion wave driven Rayleigh-Taylor instability *R. Morgan, O. Likhachev, J. Jacobs*	

Monday Morning, 25 November 2013					
Session	**09:18**	**09:31**	**09:44**	**09:57**	**10:10**
G31. Porous Media Flows V: CO2 Sequestration Room: 402 Chair: A. Soldati, U. of Udine	**G31.07** Dissolution driven convection for carbon dioxide sequestration: the stability problem *S. Mandre, X. Guo, A. Slim*	**G31.08** Hazards from a massive release of CO2 such as the 1986 Lake Nyos event *D. Sher, A. Woods*	**G31.09** Impact of wettability on two-phase displacement patterns in granular media *R. Juanes, M. Trojer, M. Szulczewski, R. Holtzman*		**Refreshment Break**, 10:10–10:30 Exhibit Hall A
G32. Granular Flows I: Impact, Locomotion and Drag Room: 403 Chair: A. Winter, Massachusetts Institute of Technology	**G32.07** Sidewinding as a control template for climbing on sand *H. Marvi, C. Gong, N. Gravish, J. Mendeslon, R. Hatton, H. Choset, D. Goldman, D. Hu*	**G32.08** A predictive, nonlocal rheology for granular flows *K. Kamrin, D. Henann*			
G33. Drops VII: Wetting and Spreading Room: 404 Chair: A. Sauret, Princeton U.	**G33.07** Relaxation of contact-line singularities solely by the Kelvin effect and apparent contact angles for isothermal volatile liquids in contact with air *A. Rednikov, P. Colinet*	**G33.08** X-ray imaging technique for studying contact-line statics and dynamics of drops on soft substrates *S. Park, J. Lee, J. Lee, J. Kim, B. Weon, J. Je*	**G33.09** Multiscale approach to studying super-spreading: molecular dynamics and continuum-level models *P. Theodorakis, E. Muller, R. Craster, O. Matar*	**G33.10** Effects of the size of the domain in the evolution of thin films *J. Gomba, J. Mac Intyre, C. Perazzo*	
G34. Drops VIII: Fragmentation Room: 405 Chair: N. Priezjev, Michigan State U.	**G34.07** Local stability of a fluid interface near a zero-vorticity point *Y. Tseng, A. Prosperetti*	**G34.08** Ligament breakup without surface tension *L. Vincent, L. Duchemin, S. Le Dizès, E. Villermaux*	**G34.09** Influence of Geometry on Instability: Breakup of fluid strips with square-wave perturbations *K. Mahady, S. Afkhami, L. Kondic*	**G34.10** The viscous Savart sheet *E. Villermaux, V. Pistre, H. Lhuissier*	
G35. Chaos, Fractals, and Dynamical Systems I: Coherent Structures Room: 406 Chair: S. Shadden, U. of California, Berkeley	**G35.07** Experimental and Numerical Study of Transition to Turbulence in a Kolmogorov-Like Flow *B. Suri, J. Tithof, R. Mitchell Jr., R. Grigoriev, M. Schatz*	**G35.08** Characterizing the dynamics of unsteady planar flows through the topology of coherent-structure-based trajectories *M. Stremler, P. Rao, S. Ross*	**G35.09** Lagrangian Chaos and Transport in a Three Dimensional Potential Flow *D. Lester, L. Smith, M. Rudman, G. Metcalfe*	**G35.10** Thermal coherent sets and heat transfer in chaotic laminar flows *S. Naik, P. Grover*	
G36. Microfluids: Drops/Bubbles Room: 407 Chair: T. Lee, City College of New York	**G36.07** The Physical Mechanisms Governing Drop Coalescence: Models vs Experiments *J. Sprittles, Y. Shikhmurzaev*	**G36.08** Optofluidic droplet coalescence on a microfluidic chip *J. Jung, K. Lee, K. Lee, H. Cho, B. Ha, G. Destgeer, H. Sung*	**G36.09** Constrained Energy Minimization of a Pinned Droplet on an Inclined Plate *M. Musterd, V. van Steijn, C. Kleijn, M. Kreutzer*	**G36.10** The way to reduce electrical charge of a droplet dispensed from a pipette tip *D. Choi, H. Lee, D. Im, D. Kim*	

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Session	**10:30**	**10:43**	**10:56**	**11:09**	**11:22**	**11:35**
H1. Jets III: Round, Liquid and Impinging Room: 323 Chair: J. J. Feng, U. of British Columbia	**H1.01** Bifurcation and Turbulent transitions of round jets *P. Bardet, A. McCleney*	**H1.02** The effect of viscosity gradients on the stability of the turbulent round jet *R. Keedy, J. Riley, A. Aliseda*	**H1.03** Time-resolved imaging studies of adjacent liquid jet formation *J. Yang, F. Brasz, C. Arnold*	**H1.04** Global stability of gravitationally stretched capillary jets *M. Rubio-Rubio, A. Sevilla, J. Gordillo*	**H1.05** Global frequency response analysis of gravitationally stretched liquid jets *P. Consoli-Lizzi, W. Coenen, A. Sevilla*	**H1.06** Auto-ejection of liquid jets and drops from capillary tubes *H. Mehrabian, J. Feng*
H2. Particle-Laden Flows V: DNS and Non-Spherical Particles Room: 324 Chair: I. Celik, West Virginia U.	**H2.01** The effect of particle rotation in multi-particle flow simulations *A. Sierakowski, A. Prosperetti*	**H2.02** Numerical Investigation of Cloud Droplet Growth via Collision Coalescence: One Step Approach *H. Parishani, O. Ayala, B. Rosa, L. Wang*	**H2.03** Effect of ambient flow inhomogeneity on drag forces on a sphere at finite Reynolds numbers *J. Kim, S. Balachandar, H. Lee*	**H2.04** Particle dispersion in stably stratified open channel flow *S. Lovecchio, F. Zonta, A. Soldati*	**H2.05** Inertial Range Scaling in Rotations of Long Rods in Turbulence *G. Voth, S. Parsa*	**H2.06** Alignment of vorticity and rods with Lagrangian fluid stretching in turbulence *R. Ni, G. Voth*
H3. Multiphase Flows V Room: 325 Chair: R. Houim, U. of Maryland	**H3.01** A Robust Numerical Method for Compressible Dense Granular Flows *R. Houim, E. Oran*	**H3.02** Study of Influence of Experimental Technique on Measured Particle Velocity Distributions in Fluidized Bed *B. Gopalan, F. Shaffer*	**H3.03** A novel finite element framework for numerical simulation of fluidization processes and multiphase granular flow *J. Percival, Z. Xie, D. Pavlidis, J. Gomes, C. Pain, O. Matar*	**H3.04** Material Point Method and Multi-velocity Formulation for History Dependent Phase Transitions *D. Zhang, X. Ma*	**H3.05** Computational model and simulations of gas-liquid-solid three-phase interactions *L. Zhang, C. Wang*	**H3.06** Analysis on the formation and growth of condensing aerosol particles in a turbulent mixing layer *K. Zhou, A. Attili, A. Al-Shaarawi , F. Bisetti*
H4. Separated Flows II - Wakes and Flows past Special Surfaces Room: 326 Chair: R. Baurle, NASA Langley	**H4.01** Low-Reynolds number compressible flow around a triangular airfoil *P. Munday, K. Taira, T. Suwa, D. Numata, K. Asai*	**H4.02** Viscous-Inviscid Interaction Analysis in High-Reynolds Number Flows Using Complex Singularities *K. Cassel, F. Gargano, M. Sammartino, V. Sciacca*	**H4.03** Investigation of Modal Excitation of a Flexible Cylinder on Vortex Induced Vibrations *E. Gedikli, H. Zimmer, J. Dahl*	**H4.04** Dynamic mode decomposition of supersonic and transonic wakes of generic space launcher configurations *V. Statnikov, T. Sayadi, M. Meinke, W. Schroeder, P. Schmid*	**H4.05** On the relationship between boundary-layer thickness, base drag and near-wake flow of an axisymmetric bluff body *M. Salvetti, A. Mariotti, G. Buresti*	**H4.06** Turbulent flow past an obstacle embedded in a hydraulically rough and porous bed *N. Apsilidis, P. Diplas, C. Dancey, P. Vlachos, P. Bouratsis*
H5. CFD V Room: 327 Chair: T. Drozda, NASA	**H5.01** Simulation of Reacting Flow with a Discontinuous Spectral Element Method *Z. Ghiasi, F. Mashayek, J. Komperda*	**H5.02** A numerical investigation of the influence of aspect ratio in three dimensional separated flows *N. Malamataris*	**H5.03** Ablation patterns driven by simple flows *R. Crocker, D. Hagan, M. Allard, Y. Dubief, C. White*	**H5.04** Rich 3-tori dynamics in small-aspect-ratio highly counter-rotating Taylor-Couette flow – reversal of spiraling vortices *S. Altmeyer, B. Hof, F. Marques, J. Lopez*	**H5.05** Numerical Study of Flow Structure of the Taconis Oscillations in an Axisymmetric Closed Tube *K. Ishii, S. Kitagawa, S. Adachi*	**H5.06** CFD Analysis of Swing of Cricket Ball and Trajectory Prediction *J. G, J. Tom, K. Ruishikesh, J. Jose, S. Kumar*
H6. Microfluids: Fluidic Devices I Room: 328 Chair: T. Cubaud, Stony Brook U.	**H6.01** Foam imbibition in a Hele-Shaw cell via laminated microfluidic "T-junction" device *D. Parra, T. Ward*	**H6.02** Gas rivulets on a submerged solid surface: a new microfluidic technique to produce microbubbles *M. Herrada, A. Gañán-Clavo, J. Montanero*	**H6.03** Utilizing chemo-mechanically functionalized oscillating fins to "catch and release" nanoparticles in binary flow *Y. Liu, Y. Ma, A. Bhattacharya, O. Kuksenok, X. He, J. Aizenberg, A. Balazs*	**H6.04** Transporting Janus Nanoparticles Using Self-Healing Vesicles *X. Yong, E. Crabb, N. Moellers, I. Salib, G. McFarlin, O. Kuksenok, A. Balazs*	**H6.05** Life after wetting: Transport and concentration in paper-based microfluidics using ion concentration polarization *B. MacDonald, M. Gong, P. Zhang, D. Sinton*	**H6.06** Buckling of Dielectric Elastomeric Plates for Electrically Active Microfludic Pumps *D. Holmes, B. Tavakol, M. Bozlar, G. Froehlicher, H. Stone, I. Aksay*
H7. Microfluids: Interfaces and Wetting II Room: 329 Chair: L. Kondic, New Jersey Institute of Technology	**H7.01** Flow through a thin film on non-flat substrates *C. Semprebon, M. Brinkmann*	**H7.02** Altering the Flow of Gas through Modification of Surface Films *D. Seo, W. Ducker*	**H7.03** Mass Transfer of Gas on Slippery Superhydrophobic Surface *E. Karatay, P. Tsai, R. Lammertink*	**H7.04** Drag Reduction using Superhydrophobic Sanded Teflon *D. Song, R. Daniello, J. Rothstein*	**H7.05** Lubricant-impregnated surfaces for drag reduction in viscous laminar flow *B. Solomon, K. Khalil, K. Varanasi*	**H7.06** Flow-driven failure of liquid-filled surfaces *I. Jacobi, J. Wexler, H. Stone*
H8. Magnetohydrodynamics I Room: 330 Chair: O. Zikanov, U. of Michigan	**H8.01** A new divergence-free-preserving high-order scheme for magnetohydrodynamics *S. Kawai*	**H8.02** WITHDRAWN .	**H8.03** Mixed convection in duct flows with very strong transverse magnetic fields *X. Zhang, X. Lv, L. Liu, A. Schigelone, O. Zikanov*	**H8.04** Patterned turbulence in magnetohydrodynamic duct and pipe flows *O. Zikanov, D. Krasnov, Y. Li, T. Boeck, A. Thess*	**H8.05** Simulation of liquid metal duct flow at finite magnetic Reynolds number *V. Bandaru, T. Boeck, J. Schumacher*	**H8.06** Transitional liquid metal duct flow near a magnetic dipole *S. Tympel, T. Boeck, J. Schumacher*
H9. Instability: Interfacial and Thin-Film IV - Elasticity and Substrates Room: 333 Chair: Y. Young, New Jersey Institute of Technology	**H9.01** Long-wave Dynamics of a Membrane in an Electric Field *Y. Young, S. Veerapaneni, M. Miksis*	**H9.02** The effect of structuring on the stability of electrolyte films *C. Ketelaar, V. Ajaev*	**H9.03** The interaction between viscous fingering and wrinkling in elastic-walled Hele-Shaw cells *D. Pihler-Puzovic, A. Juel, M. Heil*	**H9.04** Bending of an elastic cantilever by gravity-driven flow of a liquid film *M. Popova, H. Kim, P. Howell, H. Stone*	**H9.05** Stability Theory for Interfacial Patterns in Magnetic Pulse Welding *A. Nassiri, G. Chini, B. Kinsey*	**H9.06** Instability-Driven Streak Formation During Convective Deposition *A. Weldon, K. Joshi, J. Gilchrist*

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Session	**10:30**	**10:43**	**10:56**	**11:09**	**11:22**	**11:35**
H10. Instability: Wakes II - Non-Cylindrical Objects and Wind Tunnels Room: 334 Chair: T. C. Lieuwen, Georgia Institute of Technology	**H10.01** Turbulent axisymmetric swirling wake: equilibrium similarity solution and experiments with a wind turbine as wake generator *M. Wosnik, N. Dufresne*	**H10.02** Experimental Investigation of Very Large Model Wind Turbine Arrays *K. Charmanski, M. Wosnik*	**H10.03** Stability of a wind turbine wake subject to root vortex perturbations *D. Smith, H. Blackburn, J. Sheridan*	**H10.04** Base Flow Asymmetry Effects on the Absolute Stability of Non-uniform Density Wakes *B. Emerson, D. Noble, T. Lieuwen*	**H10.05** The mechanisms of convective and standing wave mode generation in the wake behind very slender asisymmetric bodies by selective excitation of unstable helical modes *J. Liu, K. Lee*	**H10.06** Flow behaviour around tripped circular cylinders *A. Joshi, A. Ekmekci*
H11. Bubbles V: Rising Bubbles and Surface Interaction Room: 335 Chair: O. K. Matar, Imperial College of London	**H11.01** Interaction of two oscillating bubbles rising in a thin gap *A. Filella, V. Roig, P. Ern*	**H11.02** The effect of surfactants on path instability of a rising bubble *Y. Tagawa, S. Takagi, Y. Matsumoto*	**H11.03** Bubble rise in a non-isothermal channel with a non-monotonic dependence of the surface tension on temperature *K. Sefiane, M. Tripathi, K. Sahu, G. Karapetsas, O. Matar*	**H11.04** Numerical simulation of a bubble rising in an unconfined viscoplastic fluid with chemical reaction *M. Tripathi, K. Sahu, G. Karapetsas, O. Matar*	**H11.05** Effects of surfactant and electrolyte on the drainage of the thin liquid film between a glass plate and a bubble approaching at a constant velocity *S. Shimoyama, T. Ogasawara, H. Takahira*	**H11.06** Experimental study of the interaction of a bubble with an inclined wall *C. Barbosa, R. Zenit, D. Legendre*
H12. Vortex Dynamics and Vortex Flows VI Room: 336 Chair: W. Irvine, U. of Chicago	**H12.01** Dynamics of Quasi 2D and 3D Co-rotating Vortex Merger *A. Khandekar, J. Jacob*	**H12.02** Interaction of a vortex ring with a natural convective layer *C. Palacios-Morales, M. Salinas, F. Solorio-Ordaz, R. Zenit*	**H12.03** Interactions of two unequal co-rotating viscous vortices in the presence of external shear *P. Folz, K. Nomura*	**H12.04** Investigation of the Unsteady Total Pressure Profile Corresponding to Counter-Rotating Vortices in an Internal Flow Application *K. Gordon, S. Morris, A. Jemcov, J. Cameron*	**H12.05** Analysis of the formation and evolution of vortex rings in non Newtonian fluids using 3D PTV *A. Bajpayee, A. Techet*	**H12.06** Buoyancy-Induced Columnar Vortices *M. Simpson, A. Glezer*
H13. Granular Flows II: Applications Room: 301 Chair: N. Pohlman, Northern Illinois U.	**H13.01** Erosion and flow of hydrophobic granular materials *B. Utter, T. Benns, J. Mahler*	**H13.02** Granular dynamics of the low fill regime in a cylindrical tumbler: particle-wall slip *D. Diaz, P. Umbanhowar, J. Ottino, R. Lueptow*	**H13.03** The effects of soft-sphere contact models on heat transfer to particles flowing over a heated surface *A. Morris, C. Hrenya, Z. Ma, S. Pannala, T. O'Brien*	**H13.04** Stagnation, circulation, and erosion of granular materials through belt conveyor sluice gate *N. Pohlman, M. Moralda, R. Dunne*	**H13.05** Incorporation of Interstitial Gas Effects on Granular Flows *C. Hrenya, V. Garzo, S. Tenneti, S. Subramaniam*	**H13.06** Experimental and computational investigation on the flow behavior of granular particles through an inclined rotating chute *S. Shirsath, J. Padding, H. Clercx, H. Kuipers*
H14. Experimental Techniques V: Two-Phase/Ablation Room: 302 Chair: D. G. Bohl, Clarkson U.	**H14.01** Comparison of Global Sizing Velocimetry and Phase Doppler Anemometry measurements of alternative jet fuel sprays *R. Sadr, K. Kannaiyan*	**H14.02** Dark Field Imaging of Multiphase Fluid Flows *B. Scharfman, A. Techet*	**H14.03** Naphthalene Planar Laser-Induced Fluorescence Imaging of Orion Multi-Purpose Crew Vehicle Heat Shield Ablation Products *C. Combs, N. Clemens, P. Danehy*	**H14.04** Optimization of Chemical Concentrations for Molecular Tagging Velocimetry *W. Spellman, D. Bohl*	**H14.05** Adsorption of diatoms at the oil-water interface *N. Fathollahi, J. Sheng*	**H14.06** Dynamics of particle—turbulence interaction at the dissipative scales *H. Bocanegra Evans, N. Dam, W. van de Water*
H16. Reacting Flows V: Kinetics Room: 304 Chair: V. Raman, U. of Texas at Austin	**H16.01** An Assessment of the RCCE for Computationally Efficient Combustion Simulations with Detailed Kinetics *F. Hadi, M. Janbozorgi, R. Sheikhi, H. Metghalchi*	**H16.02** An adjoint approach for determining sensitivity of laminar flames *K. Braman, T. Oliver, V. Raman*	**H16.03** The Quantum-Kinetic Chemical Reaction Model for Navier-Stokes Codes *M. Gallis, R. Wagnild, J. Torczynski*	**H16.04** On the potential failure of reduced reaction kinetics *J. Powers, S. Paolucci*	**H16.05** Investigations of spontaneous ignition of high-pressure hydrogen release based on detailed chemical kinetics *H. Terashima, M. Koshi, T. Mogi, R. Dobashi*	
H17. Biofluids: Locomotion VI - Swimming and Flapping Models Room: 305 Chair: O. Curet, Florida Atlantic U.	**H17.01** Simple asymptotic results for the role of flexibility in flapping propulsion *M. Moore*	**H17.02** Predicting Fruit Fly's Sensing Rate From Insect Flight Simulations *J. Wang, S. Chang*	**H17.03** Insect flight on fluid interfaces: a chaotic interfacial oscillator *H. Mukundarajan, M. Prakash*	**H17.04** Does dragonfly's abdomen flexion help with fast turning maneuvers? *G. Liu, C. Li, H. Dong*	**H17.05** Swimming near deformable membranes at low Reynolds number *M. Dias, T. Powers*	**H17.06** On the interactions between two undulatory swimmers and between a swimmer and a boundary *J. Yuan, H. Bau*
H18. Biofluids: General IV - Plant Biomechanics Room: 306/307 Chair: L. Miller, U. of North Carolina	**H18.01** Reconfiguration of broad leaves into cones *L. Miller*	**H18.02** Physical Limits to Leaf Size in Tall Trees *K. Jensen, N. Holbrook, M. Zwieniecki*	**H18.03** Nuclear traffic and peloton formation in fungal networks *M. Roper, P. Hickey, S. Lewkiewicz, E. Dressaire, N. Read*	**H18.04** Moss hair water transport *Z. Pan, N. Wu, R. Hurd, S. Thomson, W. Pitt, T. Truscott*	**H18.05** Control of fluidic environments by mushrooms *E. Dressaire, J. Santoso, L. Yamada, M. Roper*	**H18.06** Self-burial mechanics of hygroscopically active awns *W. Jung, W. Kim, H. Kim*
H19. Biofluids: Cellular III - Computational Studies on Mechanical Properties of Cellular Flows Room: 310/311 Chair: J. Freund, U. of Illinois	**H19.01** Lipid tubule growth by osmotic pressure *P. Rangamani, D. Zhang, G. Orster, A. Shen*	**H19.02** Lattice Boltzmann simulations of leukocyte rolling and deformation in a three-dimensional shear flow *Y. Luo, D. Qi, G. He*	**H19.03** Effect of asymmetric deformation on capsule lateral migration *S. Nix, Y. Imai, D. Matsunaga, T. Ishikawa, T. Yamaguchi*	**H19.04** Relaxation of deformed drops, vesicles, and cells *M. Yu, J. Zhang, H. Lin, J. Zahn, W. Tan*	**H19.05** Flow-induced segregation in confined multicomponent suspensions: Effects of particle size and rigidity *M. Graham, A. Kumar*	**H19.06** The wall traction induced by flowing red blood cells in model microvessels and its potential mechanotransduction *J. Freund, J. Vermot*

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Session	**10:30**	**10:43**	**10:56**	**11:09**	**11:22**	**11:35**
H20. DFD/GPC Minisymposium: Global Climate Models: Dynamical Cores, Strengths and Weaknesses Room: 315 Chair: J. Brasseur, Pennsylvania State U. ; Brad Marston, Brown University, John Wettlaufer, Yale University	**H20.01** The spectral element dynamical core in the Community Atmosphere Model *M. Taylor*		**H20.02** A 3-D Finite-Volume Non-hydrostatic Icosahedral Model (NIM) *J. Lee*		**H20.03** Dynamical cores and climate modeling *P. Lauritzen*	
H21. Turbulence: Simulations IV - DNS Application Room: 316 Chair: A. Chandy, U. of Akron	**H21.01** Direct Numerical Simulations of Turbulent Ekman Layers with Increasing Static Stability: Modifications to the Bulk Structure and Second-Order Statistics *S. Shah, E. Bou-Zeid*	**H21.02** Energy dynamics in turbulence generated through concentrated regions of intense kinetic energy *A. Maqui, D. Donzis*	**H21.03** Modeling of the Gecko's skin microfibrillar structures using the Immersed Boundary method via DNS *I. Arenas, K. Carrasquillo, S. Leonardi, G. Araya, F. Hussain, L. Castillo*	**H21.04** DNS of stably stratified Taylor-Green vortex *A. Rahimi, A. Chandy*	**H21.05** DNS of helicity-induced stratified turbulent flow *A. Chandy, A. Rahimi*	**H21.06** New DNS and modeling results for turbulent pipe flow *A. Johansson, G. el Khoury, O. Grundestam, P. Schlatter, G. Brethouwer*
H22. Turbulent Mixing II Room: 317 Chair: M. Kimber, U. of Pittsburgh	**H22.01** Measurements of scalar probability density functions and conditional expectations *A. Behnamian, S. Tavoularis*	**H22.02** Revisiting measurements of small scale temperature fluctuations *C. Gebauer, C. Bahri, G. Arwatz, Y. Fan, M. Hultmark*	**H22.03** Inverse cascades sustained by the transfer rate of angular momentum in a 3D turbulent flow *J. Burguete, M. Lopez-Caballero*	**H22.04** The horizontal planar structure of kinetic energy in a model vertical-axis wind turbine array *A. Craig, R. Zeller, F. Zarama, J. Weitzman, J. Dabiri, J. Koseff*	**H22.05** Anisotropy tensor invariant assessment for counter-rotating wind turbine wakes *N. Hamilton, R. Cal*	**H22.06** Variation of the slope of the velocity power spectrum and intermittency factor corresponding to $160 < \mathrm{Re}_\lambda < 490$ *A. Puga*
H23. DFD Minisymposium: Frontiers in Combustion Physics I Room: 318 Chair: F. Williams, U. of California - San Diego	**H23.01** Direct Numerical Simulation of Turbulent Premixed Hydrogen/Air Flames in Sheared Turbulence and in Counterflow with Product Stratification *J. Chen*		**H23.02** The know unknowns: Detailed simulations and low-order modeling to characterize facility-induced non-idealities in chemical-kinetics experiments *M. Ihme*		**H23.03** Spray combustion: scales, regimes, and formulations *A. Sánchez*	
H24. Aerodynamics III Room: 319 Chair: J. Anirban, Pittsburgh Supercomputing Center	**H24.01** An Experimental Investigation on the Interferences among Multiple Turbines in Onshore and Offshore Wind Farms *W. Tian, A. Ozbay, H. Hu*	**H24.02** Energetic Turbulence Structures in the Wake of Model Wind Turbines *J. Sheng, F. Mehdi, L. Chamorro*	**H24.03** Computational analysis of a tip vortex structure shed from a bio-inspired blade *S. Gomez, L. Gilkey, B. Kaiser, S. Poroseva*	**H24.04** Analysis of Wake Profiles for Free Leading Edge Membranes in Low Reynolds Number Flow *A. Wrist, Z. Zhang, J. Hubner*	**H24.05** Aerodynamic Design of Wing based on Humpback Whale Flipper *S. Akram, F. Baig*	**H24.06** Computational Fluid Dynamics Investigation of Sand Shark Tandem Dorsal Fin *F. Atalay, F. Uslu, K. Pekkan*
H25. Flow Control V: Injection/Suction Room: 320 Chair: M. Amitay, Rensselaer Polytechnic Institute	**H25.01** Aerodynamic Control of a Pitching Airfoil by Distributed Bleed Actuation *J. Kearney, A. Glezer*	**H25.02** The effects of local blowing perturbations on thermal turbulent structures *C. Liu, G. Araya, S. Leonardi, L. Castillo*	**H25.03** A Linear Proportional Control of Turbulent Flow in a Planar Asymmetric Diffuser *D. Son, H. Choi*	**H25.04** Wavelet diagnostics of the flow control of unsteady separation on a 2D Wind Turbine Airfoil *Z. Bai, J. Lewalle, G. Wang, M. Glauser*	**H25.05** The Role of Vorticity Injection in Separation Control *K. Taira, P. Munday*	**H25.06** Numerical Investigation of Virtual Aeroshaping Due to Pitched Synthetic Jets *J. Li, O. Sahni*
H26. Reacting Flows VI: Premixed Room: 321 Chair: M. Soteriou, United Technologies Research Center	**H26.01** High Karlovitz *n*-Alkane Premixed Flame DNS: Effects of Turbulence on the Flame Structure *B. Savard, B. Bobbitt, G. Blanquart*	**H26.02** High Karlovitz *n*-Alkane Premixed Flame DNS: Effects of the Flame on Turbulence Characteristics *B. Bobbitt, B. Savard, G. Blanquart*	**H26.03** A simulation of a bluff-body stabilized turbulent premixed flame using LES-PDF *J. Kim, S. Pope*	**H26.04** Impact of Chemistry Models on Flame-Vortex Interaction *S. Lapointe, B. Bobbitt, G. Blanquart*	**H26.05** Folds and pockets in the propagation of premixed turbulent flames *N. Fogla, M. Matalon, F. Creta*	**H26.06** Turbulent combustion modeling using explicit convolution of 1-D laminar flame *S. Mukhopadhyay, R. Bastiaans, J. van Oijen, L. de Goey*
H28. Waves III Room: Spirit of Pittsburgh Ballroom B/C Chair: R. Alam, U. of California, Berkeley	**H28.01** A model for internal wave drift *F. Lin, J. Munroe*	**H28.02** Weakly nonlinear models for internal waves *S. Chen, R. Camassa*	**H28.03** Particle dispersion induced by random internal waves *O. Buhler, N. Grisouard, M. Holmes-Cerfon*	**H28.04** Internal Wave Breaking From Parametric Subharmonic Instability *J. Munroe*	**H28.05** Internal Waves Generated By A Horizontally Moving Source In A Thermocline - A WKB Approach *L. Brandt, C. Keppel, J. Rottman, D. Broutman*	**H28.06** Stability of internal wave beams to three-dimensional modulations *T. Akylas, T. Kataoka*
H30. Compressible Flows I: DNS Room: 408 Chair: T. Oliver, U. of Texas at Austin	**H30.01** The convergence of DNS results to the LIA solution in canonical shock-turbulence interaction *J. Ryu, D. Livescu*	**H30.02** Reynolds Stress Anisotropy and Vortex Structures in Compressible Homogeneous Turbulent Shear Flow *V. Bhutoria, G. Blaisdell, M. Rao*	**H30.03** High-speed laminar-turbulent boundary layer transition induced by a discrete roughness element *P. Iyer, K. Mahesh*	**H30.04** The role of compressions and expansions in stationary compressible isotropic turbulence *S. Jagannathan, D. Donzis*	**H30.05** Predictive Inner-Outer Wall Model for Hypersonic Turbulent Boundary Layers *P. Martin, C. Helm*	**H30.06** A Semi-Implicit, Fourier-Galerkin/B-Spline Collocation Approach for DNS of Compressible, Reacting, Wall-Bounded Flow *T. Oliver, R. Ulerich, V. Topalian, N. Malaya, R. Moser*

Monday Morning, 25 November 2013						
Session	**10:30**	**10:43**	**10:56**	**11:09**	**11:22**	**11:35**
H31. Porous Media Flows VI: Imbibition and Injection Room: 402 Chair: C. H. Hidrovo, U. of Texas at Austin	**H31.01** Droplet Impact and Penetration on a Series of Capillary Tubes *S. Hosseini, A. Dalili, N. Ashgriz, S. Chandra*	**H31.02** Design of Capillary Flows with Spatially Graded Porous Films *Y. Joung, B. Figliuzzi, C. Buie*	**H31.03** Phase-field modeling of two-phase flow in porous media with partial wetting *L. Cueto-Felgueroso, R. Juanes*	**H31.04** Saffman-Taylor fingering with lateral injection with applications to imbibition coarsening dynamics *B. Lagree, S. Zaleski, I. Bondino, C. Josserand, S. Popinet*	**H31.05** Mechanics of fluid injection into a soft granular material *C. MacMinn, E. Dufresne, J. Wettlaufer*	**H31.06** The usage of differential method in determining the multiphase flow transport parameters in porous media *B. Markicevic*
H32. Viscous Flows II: Flows in Viscous Fluids Room: 403 Chair: D. Saintillan, U. of Illinois at Urbana-Champaign	**H32.01** Motion of a Bellows and a Free Surface in a Closed Vibrated Liquid-Filled Container *J. Torczynski, L. Romero, T. O'Hern*	**H32.02** On the inertial motions of liquid-filled rigid bodies *G. Mazzone, G. Galdi, P. Zunino*	**H32.03** Trajectory and flow properties for a rod spinning in a viscous fluid: An asymptotic solution with a no-slip plane *L. Zhao, R. Camassa, T. Leiterman, R. McLaughlin, L. Vicci*	**H32.04** Three-dimensional Developing Flow in a Long Serpentine Channel *S. Vanka*	**H32.05** The sedimentation of flexible filaments: Shapes, trajectories, and clouds *S. Spagnolie, L. Li, H. Manikantan, D. Saintillan*	**H32.06** The sedimentation of flexible filaments: A buckling instability *H. Manikantan, D. Saintillan, L. Li, S. Spagnolie*
H33. Drops IX: Evaporating Sessile Drops Room: 404 Chair: P. Kavehpour, U. of California, Los Angeles	**H33.01** Dynamics of evaporating sessile droplets *P. Sáenz, P. Valluri, K. Sefiane, G. Karapetsas, J. Kim, O. Matar*	**H33.02** Evaporating sessile drops: theory and experiment *S. Morris*	**H33.03** On the lifetimes of evaporating droplets *S. Wilson, J. Stauber, B. Duffy, K. Sefiane*	**H33.04** Contact line and bulk velocities in evaporating micron-scale droplets *Y. Fan, K. Breuer*	**H33.05** Volumetric thermal measurements using thermo-liquid crystal (TLC) micro-particles in evaporating drops *R. Segura, A. Marin, C. Kaehler*	**H33.06** Marangoni or not Marangoni? Thermal Marangoni flow measurements in evaporating drops *A. Marin, R. Liepelt, M. Rossi, C. Kaehler*
H34. Drops X: Splashing on Heated Surfaces Room: 405 Chair: V. Ajaev, Southern Methodist U.	**H34.01** Splash transition of droplets impacting on heated surfaces *H. Staat, T. Tran, B. Geerdink, C. Sun, D. Lohse*	**H34.02** Microdroplet impact on superheated surfaces: Vapor triggers splashing *T. Tran, Y. Tagawa, Y. Xie, C. Sun, D. Lohse*	**H34.03** The Effect of Disturbances and Surrounding Air on the Droplet Impact Phenomena *A. Work, Y. Lian, M. Sussman*	**H34.04** How drops bounce and dance on ice: the role of sublimating surfaces *C. Antonini, I. Bernagozzi, S. Jung, D. Poulikakos, M. Marengo*	**H34.05** Quantitative visualization of droplet hot-surface interaction *N. Erkan, K. Okamoto*	**H34.06** Contribution of enhanced heat transfer in individual droplet impact cavities to overall heat transfer in spray cooling *J. Kuhlman, N. Hillen*
H35. Chaos, Fractals, and Dynamical Systems II: Analysis, Prediction, and Control Room: 406 Chair: G. Haller, Eidgenossische Technische Hochschule Zurich	**H35.01** Novel sampling strategies for dynamic mode decomposition *J. Tu, D. Luchtenburg, C. Rowley, S. Brunton, J. Kutz*	**H35.02** Effects of small noise on the DMD/Koopman spectrum *S. Bagheri*	**H35.03** Attractor Identification from Empirical Data Using Diffusion-Mapped Delay Coordinates *Z. Greguric Ferencek, T. Berry, T. Sauer, J. Cressman*	**H35.04** Nonlinear analysis of polymer electrolyte fuel cell dynamics with cathode two-phase flow *M. Burkholder, S. Litster*	**H35.05** Is Chaotic Advection Inherent to Porous Media Flow? *D. Lester, G. Metcalfe, M. Trefry*	**H35.06** Collaborative tracking and control in time-dependent stochastic dynamical systems *E. Forgoston, A. Hsieh, I. Schwartz, P. Yecko*
H36. Geophysical: Oceanographic V Room: 407 Chair: R. Verzicco, U. of Rome, Tor Vergata	**H36.01** Relevancy of the buoyancy Reynolds number in stably stratified turbulence *B. Mater, S. Venayagamoorthy*	**H36.02** Stability of Baroclinic Vortices in Rotating Stratified Flows *M. Mahdinia, P. Hassanzadeh, P. Marcus*	**H36.03** From Balanced Barotropic and Baroclinic Shear to Turbulence in Rotating and Stratified Flow *E. Arobone, S. Sarkar*	**H36.04** Efficiency of mixing by heating or cooling in thermally stratified nonlinear spin-up *M. Baghdasarian, A. Pacheco-Vega, R. Verzicco, J. Pacheco*	**H36.05** Turbulence Statistics in the Inner Part of the Coastal Ocean Bottom Boundary Layer *A. Nayak, C. Li, B. Kiani, J. Katz*	**H36.06** Numerical Simulation of Bottom Boundary Layer Turbulence under an Internal Solitary Wave of Depression *T. Sakai, P. Diamessis, G. Jacobs*

Monday Morning, 25 November 2013					
Session	**11:48**	**12:01**	**12:14**	**12:27**	**12:40**
H1. Jets III: Round, Liquid and Impinging Room: 323 Chair: J. J. Feng, U. of British Columbia	**H1.07** Surface Pressure Fluctuations Produced by an Axisymmetric Impinging Jet: Generation Mechanisms *M. Al-Aweni, A. Naguib*	**H1.08** Surface Pressure Fluctuations Produced by an Axisymmetric Impinging Jet: Spatio-Temporal Characteristics *A. Naguib, M. Al-Aweni*	**H1.09** Effects of density, velocity gradient, and compressibility on side-jet formation in round jets with variable density *A. Muramatsu*		**Lunch Break**, 12:40–14:00
H2. Particle-Laden Flows V: DNS and Non-Spherical Particles Room: 324 Chair: I. Celik, West Virginia U.	**H2.07** On the compaction of fibers in a flow and the formation of sea balls *P. Le Gal, G. Verhille*	**H2.08** Rotation of rigid fibers in wall shear turbulence *C. Marchioli, A. Soldati*	**H2.09** Surface singularities of nanorod laden droplets in magnetic field *K. Kornev, A. Tokarev, W. Lee*		
H3. Multiphase Flows V Room: 325 Chair: R. Houim, U. of Maryland	**H3.07** Time resolved measurements of rigid fiber dispersion in near homogeneous isotropic turbulence *L. Sabban, A. Cohen, R. van Hout*	**H3.08** Intrinsic backflow near the wall in a sedimenting suspension of fibres *F. Zhang, A. Dahlkild, F. Lundell*	**H3.09** Fine Structure in Energy Dissipation at the onset of turbulence under oscillatory Flow *R. Dutta, S. Sajjadi*	**H3.10** Development of iterative algorithms of increased convergence and accuracy for multiphase flow simulation *M. Filatov, D. Maksimov*	
H4. Separated Flows II - Wakes and Flows past Special Surfaces Room: 326 Chair: R. Baurle, NASA Langley	**H4.07** Flow around a superhydrophobic cylinder *J. Shang, B. Rosenberg, P. Dewey, H. Stone, A. Smits*	**H4.08** Flow over Barnacles–Characterization of Barnacle Geometry and Some Initial Flow Characteristics *J. Sadique, X. Yang, C. Meneveau, M. Schultz, R. Mittal*			
H5. CFD V Room: 327 Chair: T. Drozda, NASA	**H5.07** CFD methodology of a model quadrotor *B. Sunan*	**H5.08** Using Navier-Stokes to Characterize Re-Entry of Microscale Vehicles *S. Thiruvenkadam, H. Ben*	**H5.09** von Neumann Stability Analysis of Pressure-Based Formulation of 1D and 2D Euler Equations *S. Konangi, U. Ghia*		
H6. Microfluids: Fluidic Devices I Room: 328 Chair: T. Cubaud, Stony Brook U.	**H6.07** Towards 2D field-flow fractionation - Vector separation over slanted open cavities *J. Bernate, M. Yang, H. Zhao, S. Risbud, C. Paul, M. Dallas, K. Konstantopoulos, G. Drazer, E. Shaqfeh*	**H6.08** Large modulation of light beams by surface acoustic waves *B. Ha, K. Lee, G. Destgeer, J. Jung, H. Sung*			
H7. Microfluids: Interfaces and Wetting II Room: 329 Chair: L. Kondic, New Jersey Institute of Technology	**H7.07** Molecular dynamics simulations of disjoining pressure effects in ultra-thin water films on a metal surface *H. Hu, Y. Sun*	**H7.08** Computational modelling of microfluidic capillary breakup phenomena *Y. Li, J. Sprittles, J. Oliver*	**H7.09** Computational and experimental investigation of capillary self-focusing in a microfluidic system *S. Afkhami, M. Hein, R. Seemann, L. Kondic*		
H8. Magnetohydrodynamics I Room: 330 Chair: O. Zikanov, U. of Michigan	**H8.07** Flow velocimetry for weakly conducting electrolytes based on high resolution Lorentz force measurement. *C. Resagk, R. Ebert, S. Vasilyan, A. Wiederhold*				
H9. Instability: Interfacial and Thin-Film IV - Elasticity and Substrates Room: 333 Chair: Y. Young, New Jersey Institute of Technology	**H9.07** Effect of lateral vibrations during convective deposition *T. Muangnapoh, A. Weldon, J. Gilchrist*	**H9.08** Faraday instability on patterned surfaces *J. Feng, G. Rubinstein, I. Jacobi, H. Stone*	**H9.09** Bottom reconstruction in power-law thin-film flow over topography *S. Chakraborty, U. Ranganathan*		

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Session	**11:48**	**12:01**	**12:14**	**12:27**	**12:40**
H10. Instability: Wakes II - Non-Cylindrical Objects and Wind Tunnels Room: 334 Chair: T. C. Lieuwen, Georgia Institute of Technology	**H10.07** Experimental study of the interaction between the horseshoe system and the vortex shedding of a wall-mounted rectangular cylinder *M. El Hassan, R. Martinuzzi*	**H10.08** Path instabilities of heavy bodies in free fall in a viscous fluid: wake dynamics vs. aerodynamic effects *D. Fabre, K. Selvam, J. Tchoufag, P. Assemat, J. Magnaudet*			**Lunch Break**, 12:40–14:00
H11. Bubbles V: Rising Bubbles and Surface Interaction Room: 335 Chair: O. K. Matar, Imperial College of London	**H11.07** On the thickness of a film generated during a topological rearrangement *P. Petit, J. Seiwert, I. Cantat, A. Biance*	**H11.08** Formation of Gas Pockets in a Boundary Layer Under Turbulent Forcing *F. Pereira, D. Jeon, M. Gharib*	**H11.09** Void fraction and bubble size in a simulated hydraulic jump *A. Witt, J. Gulliver, L. Shen*		
H12. Vortex Dynamics and Vortex Flows VI Room: 336 Chair: W. Irvine, U. of Chicago	**H12.07** The Far Field Structure of a Jet in Cross-Flow *N. Lanitis, J. Dawson*	**H12.08** Numerical simulation of a spanwise vortex in a tidal induced flow *E. Lopez-Sanchez, G. Ruiz-Chavarria*	**H12.09** On Clarifying the Mechanisms for Persistent Asymmetries in Advecting Vortical Motions *J. Elsnab, H. Ui Ain, J. Klewicki*		
H13. Granular Flows II: Applications Room: 301 Chair: N. Pohlman, Northern Illinois U.	**H13.07** Collapsing granular beds: The role of interstitial air *D. van der Meer, C. Gjaltema, T. Homan*	**H13.08** Avalanche to Continuous flow transition in wet and cohesive granular media *A. Orpe, S. Basu, P. Doshi*	**H13.09** Mean fields and velocity distribution functions in dilute granular Poiseuille flow *D. Shivanna, M. Alam*		
H14. Experimental Techniques V: Two-Phase/Ablation Room: 302 Chair: D. G. Bohl, Clarkson U.	**H14.07** Wall Shear Stress in Oscillating Channel Flow Using Particle Image Velocimetry *B. Lance, J. Roberts, B. Smith, S. Kearney*	**H14.08** The gas generation measurement at high electric filed in electrokinetic devices *M. Tawfik, T. Hansen, F. Diez*	**H14.09** Mechanisms and methods for biofouling prevention via aeration *N. Dickenson, C. Henoch, J. Belden*	**H14.10** Optical sensor for detection of supercavity-body contact location *J. Belden, M. Jandron, T. Truscott*	
H16. Reacting Flows V: Kinetics Room: 304 Chair: V. Raman, U. of Texas at Austin					
H17. Biofluids: Locomotion VI - Swimming and Flapping Models Room: 305 Chair: O. Curet, Florida Atlantic U.	**H17.07** Symmetry breaking of rigid/flexible plates in bluff body wakes generates rotation and drift *N. Brosse, U. Lacis, F. Lundell, S. Bagheri, F. Ingremeau, H. Kellay, A. Mazzino*	**H17.08** On the role of reduction by symmetry in understanding swimming at mid-Reynolds *H. Jacobs*	**H17.09** Efficient kinematics for jet-propelled swimming *S. Alben, L. Miller, J. Peng*		
H18. Biofluids: General IV - Plant Biomechanics Room: 306/307 Chair: L. Miller, U. of North Carolina	**H18.07** Physicochemical hydrodynamics of porous structures in vascular plants *J. Ryu, S. Ahn, S. Kim, T. Kim, S. Lee*				
H19. Biofluids: Cellular III - Computational Studies on Mechanical Properties of Cellular Flows Room: 310/311 Chair: J. Freund, U. of Illinois	**H19.07** Capturing mechanical properties of biological cells using coarse-grained modeling *W. Mao, M. Chang, A. Alexeev*	**H19.08** Effect of cytoskeleton stress-free state on red blood cell responses in low shear rate flows *Q. Zhu, Z. Peng, A. Mashayekh*	**H19.09** Nonlinear Response of Bio-Polymers Subject to Stretching Flow with Thermal Noise *M. Deng, L. Grinberg, B. Caswell, G. Karniadakis*		

Monday Morning, 25 November 2013					
Session	**11:48**	**12:01**	**12:14**	**12:27**	**12:40**
H20. DFD/GPC Minisymposium: Global Climate Models: Dynamical Cores, Strengths and Weaknesses Room: 315 Chair: J. Brasseur, Pennsylvania State U. ; Brad Marston, Brown University, John Wettlaufer, Yale University	**H20.04** Intercomparison of General Circulation Models for Hot Extrasolar Planet Atmospheres *J. Cho*		**H20.05** Exploring effects of different dynamical cores in global climate models on regional predictions *C. Forest*		**Lunch Break**, 12:40–14:00
H21. Turbulence: Simulations IV - DNS Application Room: 316 Chair: A. Chandy, U. of Akron	**H21.07** Direct numerical simulation of turbulence in a bent pipe *P. Schlatter, A. Noorani*	**H21.08** Enstrophy along particle trajectories through vortex clusters in DNS of turbulent channel flow *J. Hackl, J. Jimenez*			
H22. Turbulent Mixing II Room: 317 Chair: M. Kimber, U. of Pittsburgh	**H22.07** Turbulent velocity and concentration measurements in a macro-scale multi-inlet vortex nanoprecipitation reactor *Z. Liu, R. Fox, J. Hill, M. Olsen*	**H22.08** Characterization of the Flow Field Over an Ablative Surface *M. Allard, C. White, Y. Dubief*	**H22.09** Turbulent dispersivity under conditions relevant to airborne disease transmission between laboratory animals *S. Halloran, W. Ristenpart*		
H23. DFD Minisymposium: Frontiers in Combustion Physics I Room: 318 Chair: F. Williams, U. of California - San Diego	**H23.04** Modeling Interactions Among Turbulence, Gas-Phase Chemistry, Soot and Radiation Using Transported PDF Methods *D. Haworth*		**H23.05** Investigation of turbulent spherical flames *N. Swaminathan*		
H24. Aerodynamics III Room: 319 Chair: J. Anirban, Pittsburgh Supercomputing Center	**H24.07** Flexible body with drag independent of the flow velocity *T. Barois, E. de Langre*	**H24.08** Large-eddy simulations of the Lillgrund wind farm *K. Nilsson, S. Breton, S. Ivanell, D. Henningson*	**H24.09** Experimental study on influence of pitch motion on the wake of a floating wind turbine model *S. Rockel, R. Cal, J. Peinke, M. Hoelling*	**H24.10** Span efficiency of wings with leading edge protuberances *D. Custodio, C. Henoch, H. Johari*	
H25. Flow Control V: Injection/Suction Room: 320 Chair: M. Amitay, Rensselaer Polytechnic Institute	**H25.07** Dynamic Stall of Finite Span Blades and its Control *K. Taylor, C. Leong, M. Amitay*	**H25.08** Active Flow Control of a Transonic Shock over Curved Surfaces *A. Gissen, B. Vukasinovic, A. Glezer, S. Gogineni*	**H25.09** 3-D Separation Control using Spatially-Compact, Pulsed Actuation *G. Woo, A. Glezer*		
H26. Reacting Flows VI: Premixed Room: 321 Chair: M. Soteriou, United Technologies Research Center	**H26.07** Numerical forcing of an M-flame: linear analysis *M. Blanchard, P. Schmid, D. Sipp, T. Schuller, S. Candel*	**H26.08** Flame Thickness and Conditional Scalar Dissipation Rate in a Premixed Temporal Turbulent Reacting Jet *S. Chaudhuri, H. Kolla, E. Hawkes, J. Chen, C. Law*			
H28. Waves III Room: Spirit of Pittsburgh Ballroom B/C Chair: R. Alam, U. of California, Berkeley	**H28.07** Interactions between capillary wave turbulence and hydrodynamics turbulence *M. Berhanu, L. Gordillo, T. Jamin, E. Falcon*	**H28.08** On the unsteady gravity-capillary wave pattern found behind a slow moving localized pressure distribution *N. Masnadi, J. Duncan*	**H28.09** 3D Solitons of Capillary-Gravity and Flexural-Gravity Waves *R. Alam*	**H28.10** Capillary Gravity Waves over an Obstruction - Forced Generalized KdV equation *J. Choi, S. Whang, S. Sun*	
H30. Compressible Flows I: DNS Room: 408 Chair: T. Oliver, U. of Texas at Austin	**H30.07** Direct Numerical Simulation of a Compressible Reacting Boundary Layer using a Temporal Slow Growth Homogenization *V. Topalian, T. Oliver, R. Ulerich, R. Moser*				

Monday Morning, 25 November 2013					
Session	**11:48**	**12:01**	**12:14**	**12:27**	**12:40**
H31. Porous Media Flows VI: Imbibition and Injection Room: 402 Chair: C. H. Hidrovo, U. of Texas at Austin	**H31.07** Pore-scale modeling of Capillary Penetration of Wetting Liquid into 3D Fibrous Media: A Critical Examination of Equivalent Capillary Concept *N. Palakurthi, U. Ghia, K. Comer*	**H31.08** Optimization of Micropillar Arrays for Heat Pipe Applications *R. Hale, C. Hidrovo*			**Lunch Break**, 12:40–14:00
H32. Viscous Flows II: Flows in Viscous Fluids Room: 403 Chair: D. Saintillan, U. of Illinois at Urbana-Champaign	**H32.07** Quantitative Viscosity Field Measurement during Viscous Fingering by Imaging Fluorescence from a Viscosity-Sensitive Molecular Probe *B. Dice, M. Rawat, S. Stewart, P. Bunton, F. Brau, A. De Wit, J. Pojman*	**H32.08** Low Reynolds number hydrodynamics of microstructured optical fiber fabrication *P. Buchak, D. Crowdy, Y. Stokes*	**H32.09** Microstructured optical fibres: how do physical parameters influence the final geometry? *Y. Stokes, P. Buchak, D. Crowdy*		
H33. Drops IX: Evaporating Sessile Drops Room: 404 Chair: P. Kavehpour, U. of California, Los Angeles	**H33.07** Approximate analytical descriptions of the stationary single-vortex Marangoni convection inside an evaporating sessile droplet of capillary size *L. Barash*	**H33.08** The effect of vapor diffusion on the evaporation of a sessile droplet on a heated substrate *M. Jutley, V. Ajaev*	**H33.09** How gravity influences hydrothermal waves in alcohol sessile droplets *F. Carle, D. Brutin*		
H34. Drops X: Splashing on Heated Surfaces Room: 405 Chair: V. Ajaev, Southern Methodist U.	**H34.07** Dropwise Condensation on a Radial Gradient Surface *A. Macner, S. Daniel, P. Steen*				
H35. Chaos, Fractals, and Dynamical Systems II: Analysis, Prediction, and Control Room: 406 Chair: G. Haller, Eidgenossische Technische Hochschule Zurich	**H35.07** Nonlinear dynamic estimation with sparse sensors *S. Brunton, J. Tu, N. Kutz*	**H35.08** Understanding the evolution of complex multiscale systems: Dynamic renormalization, non-equilibrium entropy and stochasticity *M. Pradas, M. Schmuck, G. Pavliotis, S. Kalliadasis*	**H35.09** Semi-automatic reduced order models from expert-defined transients *A. Class, D. Prill*	**H35.10** Cluster-based reduced-order modelling of a mixing layer *E. Kaiser, B. Noack, L. Cordier, A. Spohn, M. Segond, M. Abel, G. Daviller, R. Niven*	
H36. Geophysical: Oceanographic V Room: 407 Chair: R. Verzicco, U. of Rome, Tor Vergata	**H36.07** Two-dimensional irrotational nonlinear flow over arbitrary bottom topography in a Channel *S. Panda, S. Martha, A. Chakrabarti*				

Invited Session J27
14:00 – 14:35, Spirit of Pittsburgh Ballroom A
Chair: Morteza Gharib, California Institute of Technology
Do Swimming Animals Mix The Ocean? John Dabiri, California Institute of Technology

Invited Session J28
14:00 – 14:35, Spirit of Pittsburgh Ballroom B/C
Chair: Forman Williams, University of California, San Diego
Dynamics Of Transient Liquid Injection William Sirignano, University of California, Irvine

Mini Break, 14:35 – 14:40

Invited Session K27
14:40 – 15:15, Spirit of Pittsburgh Ballroom A
Chair: George Homsy, University of California, Santa Barbara
Porous-medium Convection: New Problems From CO_2 Sequestration John Lister, University of Cambridge

Invited Session K28
14:40 – 15:15, Spirit of Pittsburgh Ballroom B/C
Chair: Gareth H. McKinley, Massachusetts Institute of Technology
Drag Reduction And The Dynamics Of Turbulence In Simple And Complex Fluids Michael Graham, University of Wisconsin-Madison

Refreshment Break, 15:15 – 15:35

Monday Afternoon, 25 November 2013						
Session	**15:35**	**15:48**	**16:01**	**16:14**	**16:27**	**16:40**
L1. Geophysical: Oceanographic VI Room: 323 Chair: P. Le Gal, Aix Marseille U.	**L1.01** Breaking of the internal tide *K. Helfrich, R. Grimshaw, E. Johnson*	**L1.02** From weak to strong turbulence: a traveling wave tour *F. Fedele*	**L1.03** Large overturns at a model Luzon Strait topography: an application of the Immersed Boundary Method *N. Rapaka, S. Sarkar*	**L1.04** Response of Ocean Circulation to Different Wind Forcing in Puerto Rico and US Virgin Islands *M. Solano, E. Garcia, S. Leonardi, M. Canals, J. Capella*	**L1.05** Relation of Lagragian structures and drifter dynamics in the Gulf of Mexico *C. Mendoza, A. Mancho, S. Wiggins*	**L1.06** The Instability of Diffusive Convection and Its Implication for the Thermohaline Staircases in the Deep Arctic Ocean *S. Zhou, L. Qu, Y. Lu, X. Song*
L2. Convection and Buoyancy-Driven Flows V: Binary Systems and Stratified Flows Room: 324 Chair: E. Knobloch, U. of California, Berkeley	**L2.01** Thermal Stratification by Steam Condensation of RCIC in Suppression Pool *K. Okamoto, D. Song, N. Erkan*	**L2.02** Chemical control of hydrodynamic instabilities in partially miscible two-layer systems *A. De Wit, L. Riolfo, L. Lemaigre, F. Rossi, M. Rustici, M. Budroni*	**L2.03** Convective dissolution of carbon dioxide in salted water: linear stability analysis and effect of control parameters *V. Loodts, L. Rongy, A. De Wit*	**L2.04** Convection in binary fluids with phase change: solutocapillarity, thermocapillarity and buoyancy *Y. Li, M. Yoda*	**L2.05** Compositional transport in solidifying aqueous binary solution *J. Zhong, Z. Yin, Q. Xue, J. Wettlaufer*	**L2.06** Colliding Convectons *E. Knobloch, I. Mercader, O. Batiste, A. Alonso*
L3. Multiphase Flows VI Room: 325 Chair: I. Zadrazil, Imperial College London	**L3.01** Numerical and experimental study of disturbance wave development in vertical two-phase annular flow *G. Hewitt, J. Yang, Y. Zhao, C. Markides, O. Matar*	**L3.02** The effect of surfactant on stratified and stratifying gas-liquid flows *B. Heiles, I. Zadrazil, O. Matar*	**L3.03** Quantitative consideration of flow structures (bubble swarms and liquid motion) and dissolved CO2 concentration transportation, in a bubbly flow *D. Shinohara, T. Saito*	**L3.04** The Annular Two-phase Flow on Rod Bundle: The Effects of Spacers *T. Kunugi, S. Pham, Z. Kawara, T. Yokomine*	**L3.05** Two-Phase Lattice Boltzmann Modeling of Boiling Phenomena *M. Mohammadi Shad, T. Lee, M. Kawaji*	**L3.06** Slug front gas entrainment in gas-liquid two-phase horizontal flow using hi-speed slug-tracking *I. Zadrazil, O. Matar, C. Markides*
L4. General Fluid Dynamics I: Drag Reduction Room: 326 Chair: M. Luhar, California Institute of Technology	**L4.01** Drag reduction due to spatial thermal modulations *J. Floryan, D. Floryan*	**L4.02** Modeling drag reduction by slippery surfaces comprised of microridges with two fluids *M. Samaha, M. Hultmark*	**L4.03** Groove Optimization for Drag Reduction *A. Mohammadi, J. Floryan*	**L4.04** Drag reduction using slippery liquid infused surfaces *M. Hultmark, H. Stone, A. Smits, I. Jacobi, M. Samaha, J. Wexler, J. Shang, B. Rosenberg, L. Hellström, Y. Fan*	**L4.05** Drag reduction using a multi-cavity at the afterbody *E. Sanmiguel-Rojas, A. MartÍn-Alcántara, C. Gutiérrez-Montes, C. MartÍnez-Bazán, M. Burgos, M. Hidalgo-MartÍnez*	**L4.06** Longevity and drag reduction of omniphobic surfaces *B. Rosenberg, M. Samaha, I. Jacobi, J. Shang, M. Hultmark, A. Smits*
L5. CFD VI Room: 327 Chair: M. Liou, NASA	**L5.01** On Numerical Heating *M. Liou*	**L5.02** Numerical Investigation of Conjugate Heat Transfer in a Channel with a Growing Deposit Layer *H. Li, Y. Yap, J. Lou, J. Chai*	**L5.03** Upscale and downscale energy transfer in turbulent open channel flow *S. Lovecchio, A. Soldati*	**L5.04** Experimental Validation Dataset for CFD Simulations of Buoyancy Opposed Convection *J. Harris, B. Lance, B. Smith*	**L5.05** Computational Fluid Dynamics Uncertainty Analysis applied to Heat Transfer over a Flat Plate *C. Groves, M. Ilie, P. Schallhorn*	**L5.06** WITHDRAWN .
L6. Microfluids: Fluidic Devices II Room: 328 Chair: M. Prakash, Stanford U.	**L6.01** Mosquitoes meet microfluidics: High-throughput microfluidic tools for insect-parasite ecology in field conditions *M. Prakash, H. Mukundarajan*	**L6.02** Scale reduction impact on bacterial growth *D. Lalanne-Aulet, P. Guillot, A. Colin, P. Marchal*	**L6.03** Simulation of actuated synthetic cilia expelling microorganisms from a surface *H. Shum, A. Tripathi, J. Yeomans, A. Balazs*	**L6.04** Dancing Droplets *N. Cira, M. Prakash*	**L6.05** Synchronous Droplet Microfluidics: One "Clock" to rule them all *G. Katsikis, M. Prakash*	**L6.06** Estimation of manipulation force for droplet in O/W system under photothermal interfacial control *M. Motosuke, M. Muto*
L7. Microfluids: Particles III - Droplets and Emulsions Room: 329 Chair: S. Shojaei Zadeh, Rutgers U.	**L7.01** Lateral migration of a droplet by optical force in a uniform flow *H. Cho, J. Jung, C. Chang, H. Sung*	**L7.02** Effects of surfactants on the deformation of microfluidic drops *M. Cordero, C. Ulloa*	**L7.03** Droplet velocity in microfluidics Hele-Shaw cell: effect of the disjoining pressure *A. Huerre, O. Theodoly, I. Cantat, A. Leshansky, M. Valignat, M. Jullien*	**L7.04** Formation and dynamics of partially non-wetting droplets in square microchannels *B. Jose, T. Cubaud*	**L7.05** Controlled Gelation of Particle Suspensions Using Controlled Solvent Removal in Picoliter Droplets *S. Vuong, L. Walker, S. Anna*	**L7.06** Geometrically-protected reversibility in hydrodynamic Loschmidt-echo experiments *R. Jeanneret, D. Bartolo*
L8. Magnetohydrodynamics II Room: 330 Chair: G. A. Richards, National Energy Technology Laboratory	**L8.01** Detecting obstacles in a liquid metal flow with a small permanent magnet *C. Heinicke, A. Kundu*	**L8.02** Effects of magnetic fields on heat transfer in flowing liquid metals *J. Rhoads, E. Edlund, P. Sloboda, H. Ji*	**L8.03** An Axisymmetric Hydromagnetic Instability in Spherical-Couette Flow *M. Adams, D. Zimmerman, S. Triana, D. Lathrop*	**L8.04** Initial observations from the three meter diameter geodynamo experiment *D. Lathrop, D. Zimmerman, S. Triana, H. Nataf*	**L8.05** Non-Darcy Effects in Magnetohydrodynamic Natural Convection in a Cavity Filled with a Porous Medium *A. K C, A. Chandy*	
L9. Instability: Interfacial and Thin-Film V Room: 333 Chair: D. Lathrop, U. of Maryland	**L9.01** Acoustic Coupling to Kelvin-Helmholtz Instability at a Discontinuity Layer of Zero and Finite Thickness and Viscosity *O. Ugarte, V. Akkerman*	**L9.02** Modeling air-driven flow of a viscous film coating the interior of a rigid, vertical tube *R. Ogrosky, R. Camassa, G. Forest, J. Olander*	**L9.03** Studying gas-sheared liquid film in horizontal rectangular duct with laser-induced fluorescence technique *A. Cherdantsev, D. Hann, B. Azzopardi*	**L9.04** Wavy liquid films in interaction with a strongly confined laminar gas flow: Modeling and direct numerical simulations *G. Dietze, C. Ruyer-Quil*	**L9.05** Liquid falling films: linear stability and direct numerical simulation *P. Schmidt, L. O'Naraigh, P. Valluri, M. Lucquiaud*	**L9.06** An experimental investigation of fingering instability and growth dynamics in inclined counter-current gas-liquid channel flow *J. Purvis, R. Mistri, C. Markides, O. Matar*

Monday Afternoon, 25 November 2013						
Session	**15:35**	**15:48**	**16:01**	**16:14**	**16:27**	**16:40**
L10. Instability: General II Room: 334 Chair: O. Tammisola, U. of Cambridge	**L10.01** Oscillations in Power and Structure During the Transition to Defect Turbulence *M. Daum, Z. Greguric Ferencek, J. Cressman*	**L10.02** Numerical Simulation of Liquid Sheet Instability in a Multiphase Flow Domain *C. Souvick, S. Mahapatra, A. Mukhopadhyay, S. Sen*	**L10.03** A novel numerical approach and stability analysis of thermo-acoustic phenomenon in the Rijke tube problem *T. Sayadi, V. Le Chenadec, P. Schmid, F. Richecoeur, M. Massot*	**L10.04** Nonlinear optimization of multiple perturbations and stochastic forcing of subcritical ODE systems *D. Lecoanet, R. Kerswell*	**L10.05** Second-order sensitivity of eigenvalues: large or spanwise wavy perturbations *O. Tammisola, F. Giannetti, V. Citro, M. Juniper*	**L10.06** Unsteady engulfment regime in a three dimensional T-mixer: stability and sensitivity analyses *S. Camarri, A. Fani, M. Salvetti*
L11. Non-Newtonian Flows I Room: 335 Chair: A. Shen, U. of Washington	**L11.01** Worst-case amplification of disturbances in inertialess shear-driven flows of viscoelastic fluids *M. Jovanovic, B. Lieu, S. Kumar*	**L11.02** Linear stability analysis of the stick-slip flow of a viscoelastic fluid following the Phan-Thien Tanner model *J. Tsamopoulos, G. Karapetsas*	**L11.03** Localized disturbances in channel flow of a viscoelastic fluid *A. Agarwal, L. Brandt, T. Zaki*	**L11.04** Contravariant and covariant dumbbells in polymer-diluted viscoelastic turbulence *K. Horiuti, S. Takeu*	**L11.05** Turbulence in dilute polymer solutions *A. de Chaumont Quitry, N. Ouellette*	**L11.06** Elastic instabilities in straight channel: An increase of apparent viscosity *A. Colin, L. Martinie, J. Beaumont, H. Bodiguel, H. Kellay*
L12. Vortex Dynamics and Vortex Flows VII Room: 336 Chair: J. Naughton, U. of Wyoming	**L12.01** Suppression of vortex-induced vibrations in a flexible cylinder with elastic splitter plates *F. Huera-Huarte*	**L12.02** Harbor seal whiskers synchronize with frequency of upstream wake *H. Beem, M. Triantafyllou*	**L12.03** Vortex-Induced Vibration (VIV) Reduction Properties of Seal Whisker-Like Geometries *H. Hans, J. Miao, M. Triantafyllou*	**L12.04** Higher Harmonic Forces in Purely Crossflow Vortex-Induced Vibrations *Y. Modarres-Sadeghi, B. Seyed-Aghazadeh, R. Bourguet, G. Karniadakis, M. Triantafyllou*	**L12.05** Flow-induced vibrations of a rotating cylinder *R. Bourguet, D. Lo Jacono*	**L12.06** Vortex-Induced Vibrations of a Flexibly-Mounted Cyber-Physical Rectangular Plate *K. Onoue, B. Strom, A. Song, K. Breuer*
L13. Granular Flows III: Jamming, Cooling and Force Transmission Room: 301 Chair: .	**L13.01** Relaxation Time Scales for Dense Granular Systems *S. Mao*	**L13.02** Earthquakes in the Laboratory: Continuum-granular coupling *D. Geller, S. Gerashchenko, S. Backhaus, R. Ecke*	**L13.03** Statics and Dynamics of Force Networks in Dense Particulate Systems *L. Kondic, M. Kramar, A. Goullet, K. Mischaikow*	**L13.04** Shear Jamming for Slippery Granular Particles *D. Wang, J. Dijksman, J. Ren, R. Behringer*	**L13.05** Microscopic Order Parameter for Shear Anisotropy for Systems near Shear Jamming *J. Ren, J. Dijksman, R. Behringer*	**L13.06** Imaging Forces on Stressed Spheres *N. Brodu, J. Dijksman, H. Zheng, R. Behringer*
L14. Experimental Techniques VI: Turbulence/Fluorescence Room: 302 Chair: D. Dowling, U. of Michigan	**L14.01** A non-intrusive velocity measurement technique for naturally-occurring turbulent shear flows *C. Ng, R. Keedy, A. Aliseda*	**L14.02** PIV Measurements of Turbulent Flow Over a Permeable Wall using a Refractive-Index Matching Approach *T. Kim, G. Blois, J. Best, K. Christensen*	**L14.03** Simultaneous Velocity and Vorticity Measurement in Turbulence *H. Wu, H. Xu, E. Bodenschatz*	**L14.04** Measurement of turbulent wall shear stress in air using micro-pillars *E. Gnanamanickam, K. Kevin, J. Monty, N. Hutchins*	**L14.05** Measurements of laboratory turbulence with the 2d-Laser Cantilever Anemometer *J. Puczylowski, J. Peinke, M. Hoelling*	**L14.06** Development of Krypton Planar Laser-Induced Fluorescence for Supersonic Flow Environments *R. Burns, C. Combs, N. Clemens*
L16. Biofluids: Medical Devices Room: 304 Chair: K. Pekkan, Carnegie Mellon U.	**L16.01** Computational Simulations of Inferior Vena Cava (IVC) Filter Placement and Hemodynamics in Patient-Specific Geometries *K. Aycock, S. Sastry, J. Kim, S. Shontz, R. Campbell, K. Manning, F. Lynch, B. Craven*	**L16.02** Hemodynamics of Central Venous Catheters: experiments and simulations *M. Barbour, P. McGah, A. Clark, C. Ng, K. Gow, A. Aliseda*	**L16.03** A Novel Thin Film Nitinol Covered Neurovascular Stent Significantly Decreases Intra-Aneurysmal Flow In Vitro *Y. Chun, S. Hur, M. Shayan, C. Kealey, D. Levi, K. Mohanchandra, D. Di Carlo, G. Carman*	**L16.04** Validation of an open-source framework for the simulation of blood flow in biomedical devices *A. Quaini, T. Passerini, U. Villa, A. Veneziani, S. Canic*	**L16.05** Numerical simulations of the hemodynamics impact of stent-malapposition in a circular idealized coronary artery *E. Poon, A. Ooi, W. Pan, Y. Liu, Y. Ye, Y. Xue, P. Barlis, S. Moore*	**L16.06** Measurements of flow past a bileaflet mechanical heart valve *L. Haya, S. Tavoularis*
L17. Biofluids: Locomotion VII - Active Suspensions and Bacteria Room: 305 Chair: S. Kwon Cho, U. of Pittsburgh	**L17.01** Marangoni-driven chemotaxis, chemotactic collapse, and the Keller-Segel equation *M. Shelley, H. Masoud*	**L17.02** Coherent structures, globally aligned states, and hydrodynamic traffic jams in confined active suspensions *D. Saintillan, A. Lefauve*	**L17.03** A nonlocal kinetic theory for active suspensions in confined geometries *B. Ezhilan, D. Saintillan*	**L17.04** Rotors in low Re fluid: interactions and dynamics near a wall *E. Lushi, P. Vlahovska*	**L17.05** Active clusters and swimming crystals: instabilities and nonlinear dynamics in aggregates of model microswimmers *A. Evans*	**L17.06** Orientational order in two-dimensional confined active suspensions *A. Tsang, E. Kanso*
L18. Biofluids: General V Room: 306/307 Chair: J. Hong, U. of Minnesota	**L18.01** The Hydrodynamics and Odorant Transport Phenomena of Olfaction in the Hammerhead Shark *A. Rygg, B. Craven*	**L18.02** An Experimental Study of Flow Separation Control by Shortfin Mako Shark Skin *F. Afroz, A. Lang, P. Motta, M. Habegger*	**L18.03** 3D flow investigation near the denticles of biomimetic shark skin model using Digital In-line Holographic Microscopy *M. Toloui, J. Hong*	**L18.04** Shortfin Mako Skin: A Possible Passive Flow Control Mechanism for Drag Reduction *J. Wheelus, A. Lang, M. Bradshaw, P. Motta, M. Habegger*	**L18.05** Optimal lamellar arrangement in fish gills *K. Park, W. Kim, H. Kim*	**L18.06** Viscous-elastic interaction as a mechanism to create adhesion in frogs' toe pads *A. Gat, A. Tulchinsky*
L19. Nanofluids I Room: 310/311 Chair: S. Ghosal, Northwestern U.	**L19.01** Overlimiting current through ion concentration polarization layer: Hydrodynamic convection effects *I. Cho, S. Kim*	**L19.02** Hydrodynamic flow in the vicinity of a nanopore in response to an applied voltage *M. Mao, S. Ghosal*	**L19.03** Effect of chain stiffness on interfacial slip in nanoscale polymer films *N. Priezjev*	**L19.04** Diffusion Monte Carlo ab initio calculations to study wetting properties of graphene *Y. Wu, H. Zheng, L. Wagner, N. Aluru*	**L19.05** Prediction of the effective force on DNA in a nanopore based on density functional theory *G. Hu, W. Tang*	

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Session	**15:35**	**15:48**	**16:01**	**16:14**	**16:27**	**16:40**
L20. Boundary Layers VI: Channel Flow and Flows over Superhydrophobic Walls Room: 315 Chair: R. Rubinstein, NASA Langley	**L20.01** Representation of the velocity spectra and Reynolds stress co-spectrum in turbulent channel flow using resolvent modes *R. Moarref, A. Sharma, J. Tropp, B. McKeon*	**L20.02** High-Reynolds-number effects in turbulent channel flow: evidence from DNS *M. Bernardini, S. Pirozzoli, P. Orlandi*	**L20.03** Turbulent spots in a channel: an experimental study on the inner structure and the large-scale flow *J. Wesfreid, G. Lemoult, K. Gumowski, M. Luo, J. Aider*	**L20.04** Temperature fluctuations in fully-developed turbulent channel flow with heated upper wall *C. Bahri, M. Mueller, M. Hultmark*	**L20.05** Reynolds Number Effects on Kinetic Energy Transfer from Outer Layer in Turbulent Channel Flows *Y. Yamamoto, Y. Tsuji*	**L20.06** An investigation of the flow modification in a turbulent channel with gain-based optimal forcing *A. Sharma, R. Moarref, M. Luhar, D. Goldstein, B. McKeon*
L21. Turbulence: Simulations V Room: 316 Chair: Q. Wang, Massachusetts Institute of Technology	**L21.01** Least Squares Shadowing Sensitivity Analysis of Chaotic and Turbulent Fluid Flows *P. Blonigan, Q. Wang, S. Gomez*	**L21.02** Towards Scalable Parallel-in-Time Turbulent Flow Simulations *Q. Wang, S. Gomez, P. Blonigan, A. Gregory, E. Qian*	**L21.03** Classification of dense currents over rough walls *R. Chowdhury, K. Bhaganagar*	**L21.04** FDF in US3D *C. Otis, P. Ferrero, G. Candler, P. Givi*	**L21.05** Three-dimensional simulation of slip-streaming in vehicle aerodynamics *S. Mitra*	**L21.06** Turbulent transport at rough surfaces *S. Toppaladoddi, J. Wettlaufer, S. Succi*
L22. Turbulence: Mixing III Room: 317 Chair: A. Johansson, KTH Royal Institute of Technology	**L22.01** Large Eddy Simulation of Mixing within a Hypervelocity Scramjet Combustor *D. Petty, V. Wheatley, C. Pantano, M. Smart*	**L22.02** On the effect of fractal generated turbulence on the heat transfer of circular impinging jets *T. Astarita, G. Cafiero, S. Discetti*	**L22.03** Quantification of Mixing of a Sonic Jet in Supersonic Crossflow due to Thick Turbulent Boundary Layer Interaction *T. Rossmann, A. Pizzaia*	**L22.04** Turbulent Mixing of an Angled Jet in Various Mainstream Conditions *K. Ryan, F. Coletti, C. Elkins, J. Eaton*	**L22.05** Interaction of Inflow Jet and Flow Recirculation in Large Mixing Tanks *M. Vaas, E. Thompson, J. Kriegseis*	**L22.06** Dynamics of spinodal decomposition in turbulent flows *F. Toschi, R. Benzi, H. Clercx, D. Nelson, P. Perlekar*
L23. Turbulence: Theory V - Measurements Room: 318 Chair: G. Voth, Wesleyan U.	**L23.01** Extracting Turbulent Spectral Transfer from Under-Resolved Velocity Fields *N. Ouellette, R. Ni, G. Voth*	**L23.02** Decaying turbulence in the presence of a shearless uniform kinetic energy gradient *A. Thormann, C. Meneveau*	**L23.03** Multi-scale grid generated turbulence in an internal flow application *P. Ranade, S. Morris*	**L23.04** Alignment of two-point statistics with respect to mean deformation field in anisotropic turbulent flows *K. Morshed, L. Dasi*	**L23.05** Reconstruction of Coherent Structures from Time Shifted Data *A. Newman, L. Castillo*	**L23.06** Scale-by-scale energy transfer in the production region of a fractal grid *R. Gomes Fernandes, B. Ganapathisubramani, C. Vassilicos*
L24. Aerodynamics IV Room: 319 Chair: S. James, Honeywell Aerospace	**L24.01** On The Flow Physics of Dynamic Stall Inception *D. Coleman, F. Thomas, K. Heintz, M. Wicks, T. Corke*	**L24.02** Reduced-order vortex modeling of unsteady non-linear aerodynamics *J. Eldredge, D. Darakananda, M. Hemati*	**L24.03** Physical model of kitesurfing *P. Zimoch, A. Paxson, E. Obropta, T. Peleg, S. Parker, A. Hosoi*	**L24.04** Compressible flow in fluidic oscillators *E. Graff, D. Hirsch, M. Gharib*	**L24.05** Lift generation on a flat plate with unsteady motions *X. Xia, K. Mohseni*	**L24.06** Flow Visualization around a Simplified Two-Wheel Landing Gear *A. Ekmekci, G. Feltham*
L25. Vortex Dynamics and Vortex Flows VIII Room: 320 Chair: R. Krasny, U. of Michigan	**L25.01** Investigation of turbulent energy transport by applying POD-LSE complementary method *O. Terashima, Y. Sakai, K. Nagata, Y. Ito*	**L25.02** Formation of Small-Scale Vortex Rings from Vortex Pairs Close to the Ground *D. Asselin, C. Williamson*	**L25.03** Vortex wandering in grid turbulence *S. Pentelow, S. Tavoularis*	**L25.04** Cutting, Splicing, and Kelvin Waves *M. Scheeler, D. Kleckner, W. Irvine*	**L25.05** Three Dimensional Motions, Kelvin Waves, and Nanoparticle Tracking in Superfluid Helium *D. Meichle, D. Lathrop*	**L25.06** Adaptive particle methods for barotropic vorticity dynamics on a rotating sphere *P. Bosler, L. Wang, C. Jablonowski, R. Krasny*
L26. Reacting Flows VII: Experiments Room: 321 Chair: B. Chehroudi, Advanced Technology Consultants	**L26.01** Experimental investigation of laboratory fire whirls *K. Hartl, A. Smits*	**L26.02** Laser-Diagnostic Mapping of Temperature and Soot Statistics in a 2-m Diameter Turbulent Pool Fire *S. Kearney*	**L26.03** Experimental investigation of boundary-layer flashback in swirl flames *D. Ebi, N. Clemens*	**L26.04** Oscillatory Flame Response in Acoustically Driven Fuel Droplet Combustion *B. Lopez, C. Sevilla, T. Shoji, A. Ekmekji, O. Smith, A. Karagozian*	**L26.05** Similarity and Scaling of Turbulent Flame Speeds for Expanding Premixed Flames of C_4-C_8 n-alkanes *F. Wu, A. Saha, S. Chaudhuri, S. Yang, C. Law*	**L26.06** Structure and Dynamics of a Reacting Jet in a Swirling Vitiated Crossflow *P. Panda, M. Roa, R. Lucht*
L28. Biofluids: General VI - Fluid Film Flows Room: Spirit of Pittsburgh Ballroom B/C Chair: A. Hirsa, Rensselaer Polytechnic Institute	**L28.01** Tear Movement through a Contact Lens of Variable Thickness *M. Gerhart, D. Anderson*	**L28.02** The influence of surfactant on the stability of a liquid bilayer inside a rigid tube *Y. Song, D. Halpern, J. Grotberg*	**L28.03** A Model for Lipid Layer Dynamics on a Moving Domain *N. Gewecke, R. Braun, C. Breward*	**L28.04** A New Model for the Suction Pressure Under the Contact Lens *K. Maki, D. Ross, E. Holz*	**L28.05** How flies clean their eyes *G. Amador, F. Durand, W. Mao, A. Alexeev, D. Hu*	**L28.06** Amyloid fibril formation at a uniformly sheared air/water interface *D. Posada, A. Hirsa*
L30. Instability: Rayleigh-Taylor II Room: 408 Chair: D. Livescu, Los Alamos National Laboratory	**L30.01** Comparison Between Turbulence Model Initialization Approaches for Rayleigh-Taylor and Richtmyer-Meshkov Turbulent Mixing *B. Rollin, N. Denissen, J. Reisner, M. Andrews*	**L30.02** Blast-Driven Hydrodynamic Instability *M. Henry de Frahan, E. Johnsen*	**L30.03** Temporal Evolution and Scaling of Mixing in Two-dimensional Rayleigh-Taylor Turbulence *Q. Zhou*	**L30.04** Electrohydrodynamically induced mixing in immiscible multilayer flows *R. Cimpeanu, D. Papageorgiou*	**L30.05** The Rayleigh-Taylor Instability driven by an accel-decel-accel profile *P. Ramaprabhu, V. Karkhanis, A. Lawrie*	**L30.06** Initial Condition Effects on Turbulent Rayleigh Taylor Instability under Variable Acceleration History *D. Aslangil, A. Lawrie, A. Banerjee*

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Session	**15:35**	**15:48**	**16:01**	**16:14**	**16:27**	**16:40**
L31. Free-Surface Flows III Room: 402 Chair: J. McHugh, U. of New Hampshire	**L31.01** Experimentally observed flows inside inkjet-printed aqueous rivulets *V. Bromberg, T. Singler*	**L31.02** Investigation of bubble entrainment by breaking waves in turbulent two-phase Couette flows *D. Kim, A. Mani, P. Moin*	**L31.03** Free-surface flow driven by a deforming boundary *F. Brasz, J. Lister, C. Arnold*	**L31.04** Numerical simulation of a turbulent wall jet in a rough-bed open channel *J. Paik, F. Bombardelli, K. Loh*	**L31.05** Dispersive Hydrodynamics in Viscous Fluid Conduits *N. Lowman, M. Hoefer*	**L31.06** Free surface waves on a horizontal shear *G. Lapham, J. McHugh*
L32. Geophysical: General I - Rotating Flows Room: 403 Chair: J. Chomaz, LadHyX, CNRS-Ecole Polytechnique	**L32.01** Dynamically Consistent Shallow-Atmosphere Equations with a Complete Coriolis force *M. Tort, T. Dubos, F. Bouchut, V. Zeitlin*	**L32.02** On the Unexpected Longevity of the Great Red Spot, Oceanic Eddies, and other Baroclinic Vortices *P. Hassanzadeh, P. Marcus*	**L32.03** The role of interactions between waves and baroclinic critical layers in zombie vortex self-replication *C. Jiang, S. Pei, P. Hassanzadeh, A. Wienkers, C. Levy, P. Marcus*	**L32.04** On the Effects of Viscosity and Nonlinearity on Baroclinic Critical Layers *M. Wang, C. Jiang, P. Hassanzadeh, P. Marcus*	**L32.05** Evolution of a turbulence cloud under rotation *A. Ranjan, P. Davidson*	**L32.06** Laboratory Scale Simulating of Spiral Plumes in the Mantle *A. Sharifulin, A. Poludnitsin*
L33. Drops XI: Levitation and Propulsion on Surfaces Room: 404 Chair: S. Mandre, Brown U.	**L33.01** Dynamic levitation of droplets *A. Gauthier, C. Clanet, D. Quere*	**L33.02** Levitation of a drop over a moving surface *H. Lhuissier, Y. Tagawa, T. Tran, C. Sun*	**L33.03** Bouncing and rolling motions of capillary Leidenfrost drops on a micro-ratchet *K. Stephanoff, P. Steen, H. Lhuissier, D. Lohse*	**L33.04** Propulsion on a superhydrophobic ratchet *P. Bourrianne, G. Dupeux, C. Clanet, D. Quere*	**L33.05** Surfing on a herringbone *D. Soto, G. Lagubeau, C. Clanet, D. Quere*	**L33.06** The Walking Droplet Instability *J. Bostwick, P. Steen*
L34. Drops XII: Elastic Surfaces and Fibers Room: 405 Chair: S. Das, U. of Alberta	**L34.01** Dew-driven folding of insect wings *A. Dickerson, S. Beadles, C. Clement, D. Hu*	**L34.02** Aperture-Embedded Polymer Microlenses for Ultra-Low-Cost Microscopy Platforms (Foldscope) *L. Kroo, G. Herring, M. Prakash*	**L34.03** Interaction of Drops on a Soft Substrate *L. Lubbers, J. Weijs, S. Das, L. Botto, B. Andreotti, J. Snoeijer*	**L34.04** Elastically dominated viscous spreading *J. Neufeld, M. Malinowski*	**L34.05** Droplet impact on an elastic beam; a leaf-raindrop system *S. Gart, D. Chique, S. Jung*	**L34.06** Compound droplets on fibers *F. Weyer, L. Dreesen, M. Lismont, N. Vandewalle*
L35. Chaos, Fractals and Dynamical Systems III: Miscellaneous Topology and Model Characterization Room: 406 Chair: S. Brunton, U. of Washington	**L35.01** Describing Chaotic Dynamics in Experimental Rayleigh-Bénard Convection Using Persistent Homology Theory *J. Tithof, B. Suri, M. Kramar, V. Nanda, M. Xu, M. Paul, K. Mischaikow, M. Schatz*	**L35.02** Analyzing the dynamics of pattern formation in the space of persistence diagrams *M. Kramar, K. Mischaikow, M. Schatz, J. Tithof, M. Paul, M. Xu*	**L35.03** Burning Invariant Manifold Theory and the Bipartite Digraph Representation of Generalized Dynamical System Formed by One-way Barriers *J. Li, J. Mahoney, K. Mitchell*	**L35.04** Experimental studies of mixing barriers and reaction fronts in a steady, three-dimensional flow *H. Mills, T. Solomon*	**L35.05** Pinning of reaction fronts by burning invariant manifolds *P. Megson, T. Solomon*	**L35.06** Deterministic Aperiodic Sickle Cell Blood Flows *L. Atsaves, W. Harris*
L36. Flow Control VI: Systems and Mechanisms Room: 407 Chair: J. Kuhlman, West Virginia U.	**L36.01** An active flow control theory of the vortex breakdown process *Z. Rusak, J. Granat, S. Wang*	**L36.02** Flow control using ferrofluids *F. Cornat, D. Beck, I. Jacobi, H. Stone*	**L36.03** Vibration Amplitude of a Flexible Filament Changes Non-Monotonically with Angle of Attack *H. Akaydin, C. Voesenek, D. Lentink*	**L36.04** Control of a Separation bubble at Low Reynolds Numbers Using Electro-Active Polymers *H. Dell'Orso, L. Chang, S. Zaremski, E. DeMauro, C. Leong, M. Amitay*	**L36.05** Effect of Boundary Layer Thickness on Secondary Structures in a Short Inlet Curved Duct *J. Gartner, M. Amitay*	**L36.06** Experimental sensitivity analysis of a hydrodynamically self-excited low-density axisymmetric jet *L. Li, M. Juniper*

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L1. Geophysical: Oceanographic VI Room: 323 Chair: P. Le Gal, Aix Marseille U.	**L1.07** Laboratory experiments investigating the influence of subglacial discharge on submarine melting of Greenland's Glaciers *C. Cenedese*	**L1.08** Upstream versus downstream control of meltwater plumes under ice shelves *A. Wells*	**L1.09** Turbulent mixing in a barrier layer *H. Pham, S. Sarkar*			
L2. Convection and Buoyancy-Driven Flows V: Binary Systems and Stratified Flows Room: 324 Chair: E. Knobloch, U. of California, Berkeley	**L2.07** Accuracy of the 2D+*t* Approximation for Turbulent Wakes in Stratified Flows *L. Pauley*	**L2.08** Large eddy simulation of buoyancy induced asymmetry in horizontal jets *N. Ghaisas, S. Frankel*	**L2.09** A periodic mixing mechanism in stratified turbulent Taylor-Couette flow *R. Oglethorpe, C. Caulfield, A. Woods*	**L2.10** Flows and Stratification of an Enclosure Containing Both Localised and Vertically Distributed Sources of Buoyancy *J. Partridge, P. Linden*	**L2.11** The Radial Spreading of Intrusions Originating from a Plume in Stratified Fluid *T. Richards, Q. Aubourg, B. Sutherland*	
L3. Multiphase Flows VI Room: 325 Chair: I. Zadrazil, Imperial College London	**L3.07** Using DNS Data for Modeling of Bubbly Flows *G. Tryggvason, J. Lu*	**L3.08** Two-phase viscous flows in channels with chemically patterned walls *V. Ajaev, E. Gatapova, O. Kabov*	**L3.09** A computational model for large eddy simulation of dilute bubbly turbulent flows *M. Hajit, F. Sotiropoulos*	**L3.10** Numerical simulation of cavitating channel flows including non-condensable gases effects *M. Battistoni, S. Som, D. Longman*	**L3.11** Wall drag modification by large droplets in turbulent channel flow *L. Scarbolo, A. Soldati*	
L4. General Fluid Dynamics I: Drag Reduction Room: 326 Chair: M. Luhar, California Institute of Technology	**L4.07** Drag Reduction On Multiscale Superhydrophobic Surfaces *E. Jenner, C. Barbier, B. D'Urso*	**L4.08** Numerical investigation of drag in regular arrays of circular cylinders *S. Yokojima, Y. Kawahara*	**L4.09** Effective Medium Theory for Drag Reducing Micro-patterned Surfaces in Turbulent Flows *I. Battiato*	**L4.10** Fly in Atmosphere by Drag Force – Easy Thrust Generation Aircraft Engine Based Physics *M. Pierre Celestin*		
L5. CFD VI Room: 327 Chair: M. Liou, NASA	**L5.07** Fast geometric sensitivity analysis in hemodynamic simulations using a machine learning approach *S. Sankaran, L. Grady, C. Taylor*	**L5.08** WITHDRAWN .				
L6. Microfluids: Fluidic Devices II Room: 328 Chair: M. Prakash, Stanford U.	**L6.07** Peristaltic Micro-pump Generated from Heating Trapped Gas in a Superhydrophobic Microchannel *S. Hann, T. Kim, C. Hidrovo*	**L6.08** Two-phase droplet injectors for studies at X-ray free-electron laser facilities *C. Stan*	**L6.09** Ink-jet patterned superhydrophobic paper for open-air surface microfluidic devices *M. Elsharkawy, T. Schutzius, C. Megaridis*	**L6.10** Design of Micropost Array for Low Bubble Retention *M. Mohammadi, K. Sharp*		
L7. Microfluids: Particles III - Droplets and Emulsions Room: 329 Chair: S. Shojaei Zadeh, Rutgers U.	**L7.07** Generation of monodisperse particle-stabilized droplets with controlled particle loading at the interface *A. Kotula, C. Nelson, S. Anna*	**L7.08** Self assembly of droplets under shear *B. Shen, M. Reyssat, P. Tabeling*	**L7.09** Drag Force on Droplet in Filtration Process *M. Mikhaylenko, A. Povitsky*	**L7.10** Hindered Brownian motion of colloidal particles near a liquid-liquid interface *W. Wang, P. Huang*		
L8. Magnetohydrodynamics II Room: 330 Chair: G. A. Richards, National Energy Technology Laboratory						
L9. Instability: Interfacial and Thin-Film V Room: 333 Chair: D. Lathrop, U. of Maryland	**L9.07** Absolute and convective instabilities in turbulent gas-laminar liquid film flows *R. Vellingiri, D. Tseluiko, S. Kalliadasis*	**L9.08** Linear stability analysis of thin films in wall bounded shear flow *A. Kaffel, A. Riaz*	**L9.09** Electrostatic control of flows of moderate Reynolds number *D. Papageorgiou, A. Wray, O. Matar*	**L9.10** FRAP in thin film flows *J. Wexler, I. Jacobi, H. Stone*		

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L10. Instability: General II Room: 334 Chair: O. Tammisola, U. of Cambridge	**L10.07** Short-wave analysis of 3D and 2D instabilities in a driven cavity *P. Luchini, F. Giannetti, V. Citro*	**L10.08** Effect of an axial flow on three-dimensional instabilities in Stuart vortices *M. Mathur, S. Ortiz, T. Dubos, J. Chomaz*	**L10.09** The rich life of light rising spheres *J. Magnaudet, A. Lieu, F. Auguste*	**L10.10** Stability of Resting Cylinders *C. Lu, C. Clanet, D. Quere*		
L11. Non-Newtonian Flows I Room: 335 Chair: A. Shen, U. of Washington	**L11.07** Suppression of the Rayleigh-Plateau instability on a vertical fibre coated with wormlike micelle solutions *F. Boulogne, L. Pauchard, F. Giorgiutti-Dauphiné, M. Fardin, S. Lerouge*	**L11.08** Irreversible Gelation in Wormlike Micellar Solutions via Microfluidics *J. Cardiel, Y. Zhao, P. Cheung, A. Shen*	**L11.09** On the origin and evolution of streaks in polymeric shear flows *J. Page, T. Zaki*	**L11.10** Intermittent Flow In Yield Stress Fluids Slows Down Chaotic Mixing *J. Boujlel, D. Wendell, E. Gouillart, F. Pigeonneau, P. Jop*		
L12. Vortex Dynamics and Vortex Flows VII Room: 336 Chair: J. Naughton, U. of Wyoming	**L12.07** Vortex-induced vibration of a curved cylinder *B. Seyed-Aghazadeh, C. Budz, Y. Modarres-Sadeghi*	**L12.08** Suppression of Vortex Induced Vibrations by Fairings *Y. Yu, H. Yan, Y. Constantinides, O. Oakley, G. Karniadakis*	**L12.09** Flapping dynamics of an inverted flag *D. Kim, J. Cosse, M. Gharib*			
L13. Granular Flows III: Jamming, Cooling and Force Transmission Room: 301 Chair: .	**L13.07** Shear-rate Dependent Regime Transition in Homogeneously sheared systems of Frictionless Cohesive Granules *E. Murphy, S. Sundararajan, S. Subramaniam*	**L13.08** Translation-rotation coupling in homogeneous cooling state of a granular gas *R. Rongali, M. Alam*	**L13.09** Mechanics of sequential jamming and unjamming phenomena in a multi-exit orifice silo *A. Kunte, A. Orpe, P. Doshi*	**L13.10** Shear jamming in granular materials *J. Zhang*		
L14. Experimental Techniques VI: Turbulence/Fluorescence Room: 302 Chair: D. Dowling, U. of Michigan	**L14.07** Non-contacting Measurement of Oil Film Thickness Between Loaded Metallic Gear Teeth *D. Cox, S. Ceccio, D. Dowling*	**L14.08** Plasma Electron Density Measurements Using Phase-Sensitive FTIR Interferometry *B. Neiswander, E. Matlis, T. Corke*	**L14.09** Simultaneous measurement of flow over and transmigration through a cultured endothelial cell layer *L. Lambert, I. Pipinos, T. Baxter, J. MacTaggart, G. Karniadakis, D. Moormeier, K. Bayles, T. Wei*			
L16. Biofluids: Medical Devices Room: 304 Chair: K. Pekkan, Carnegie Mellon U.	**L16.07** On the open/close performance of prosthetic heart valves at high frequencies *A. Beltran, R. Zenit*	**L16.08** WITHDRAWN .	**L16.09** Effects of Pannus Formation on the Flow around a Bileaflet Mechanical Heart Valve *W. Kim, H. Choi, J. Kweon, D. Yang, N. Kim, Y. Kim*	**L16.10** The role of intraventricular vortices in the left ventricular filling? *P. Martinez-Legazpi, J. Bermejo, Y. Benito, M. Alhama, R. Yotti, C. Perez del Villar, A. Gonzalez-Mansilla, A. Barrio, F. Fernandez-Aviles, J. del Alamo*	**L16.11** Is aspect ratio sufficient to classify intra-aneurysmal hemodynamics- a parametric approach *M. Durka, A. Robertson*	
L17. Biofluids: Locomotion VII - Active Suspensions and Bacteria Room: 305 Chair: S. Kwon Cho, U. of Pittsburgh	**L17.07** Effects of bubble length and excitation frequency on micro propulsion by oscillating bubble *J. Feng, S. Cho*	**L17.08** Stochastic dynamics of active Brownian spheres in linear flows *M. Sandoval, E. Lauga*	**L17.09** Swimming bacteria at complex interfaces *D. Lopez, E. Lauga*	**L17.10** Artificial Rheotaxis *J. Palacci, S. Sacanna, A. Abramian, K. Hanson, D. Pine, P. Chaikin*		
L18. Biofluids: General V Room: 306/307 Chair: J. Hong, U. of Minnesota	**L18.07** The Hawaiian bobtail squid as a model system for selective particle capture in microfluidic systems. *J. Nawroth, M. McFall-Ngai, J. Dabiri*					
L19. Nanofluids I Room: 310/311 Chair: S. Ghosal, Northwestern U.						

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L20. Boundary Layers VI: Channel Flow and Flows over Superhydrophobic Walls Room: 315 Chair: R. Rubinstein, NASA Langley	**L20.07** Skin-friction Drag Reduction in Turbulent Channel Flow with Idealized Superhydrophobic Walls *A. Ratsegari, R. Akhavan*	**L20.08** A Chracterization of Superhydrophobic Surfaces for Skin-Friction Drag Reduction *H. Park, J. Kim*	**L20.09** Direct numerical simulation of turbulent flows over superhydrophobic surfaces: gas-liquid interface dynamics *J. Seo, R. García-Mayoral, A. Mani*	**L20.10** Convective Air Mass Transfer in Submerged Superhydrophobic Surfaces: Turbulent Flow *C. Barth, H. Vahedi Tafreshi, M. Gad-el-Hak*		
L21. Turbulence: Simulations V Room: 316 Chair: Q. Wang, Massachusetts Institute of Technology	**L21.07** Stochastic field modeling of cavitating flows in OpenFOAM *M. Ranft, A. Class*	**L21.08** Simulating 3D turbulence with Smoothed Particle Hydrodynamics *X. Hu, S. Adami, N. Adams*	**L21.09** Entropic Lattice Boltzmann Methods for Fluid Mechanics *S. Chikatamarla, F. Boesch, D. Sichau, I. Karlin*	**L21.10** Efficient error estimation criteria to capture vortical structures in octree meshes *C. Ozhan, D. Fuster, P. Da Costa*		
L22. Turbulence: Mixing III Room: 317 Chair: A. Johansson, KTH Royal Institute of Technology	**L22.07** Free shearless multi-material turbulent mixing in the presence and absence of gravity *P. Movahed, E. Johnsen*	**L22.08** Turbulent Buoyant Flows: A Structural Approach *P. Carroll, G. Blanquart*	**L22.09** Turbulent fountains as a model for mixing at a density interface *N. Kaye, W. Martin III*	**L22.10** Experimental variable-density mixing statistics *S. Gerashchenko, K. Prestridge*	**L22.11** Experiments on the fragmentation of a buoyant liquid volume in another liquid *M. Landeau, R. Deguen, P. Olson*	
L23. Turbulence: Theory V - Measurements Room: 318 Chair: G. Voth, Wesleyan U.	**L23.07** Fluctuations in the energy input determine Kolmogorov constants in turbulence *G. Bewley, F. Lachaussée, J. Kassel, G. Voth, E. Bodenschatz*	**L23.08** Inertial range ESS scaling deteriorates with increasing Reynolds number *E. Bodenschatz, M. Sinhuber, G. Bewley, M. Vallikivi, M. Hultmark, A. Smits*	**L23.09** Detrended analysis of Reynolds stress in a decaying turbulent flow in a wind tunnel with active grids *Z. Lu, I. Ahmad, Y. Huang*	**L23.10** Anomalous scaling of passive scalar fluctuations in a spatially developing turbulent mixing layer *A. Attili, F. Bisetti*		
L24. Aerodynamics IV Room: 319 Chair: S. James, Honeywell Aerospace	**L24.07** Tip vortex characteristics of rotor in hover *S. Mula, C. Cameron, C. Tinney, J. Sirohi*	**L24.08** Perching Dynamics and Development of a Simple Model *M. Puopolo, J. Jacob, R. Reynolds*	**L24.09** Development of a MEMS shear stress sensor for use in wind tunnel applications *C. Barnard, J. Meloy, M. Sheplak*	**L24.10** Flow structure on a rotating wing undergoing deceleration to rest *D. Tudball Smith, D. Rockwell, J. Sheridan*	**L24.11** Flow Structure on a Wing Due to Unsteady Pitch-Up and Rotation Maneuvers *M. Bross, T. Yilmaz, D. Rockwell*	**L24.12** The Speed Mach 20 is Quite Impossible in Atmosphere! How to Calculate the Speed Limit When Accelerating an Object in Atmosphere *M. Pierre Celestin*
L25. Vortex Dynamics and Vortex Flows VIII Room: 320 Chair: R. Krasny, U. of Michigan	**L25.07** Knotted Vortices: Entropic Lattice Boltzmann Method for Simulation of Vortex dynamics *F. Boesch, S. Chikatamarla, I. Karlin*	**L25.08** Numerical simulation of the fluttering instability using a pseudospectral method with volume penalization *T. Engels, D. Kolomenskiy, K. Schneider, J. Sesterhenn*	**L25.09** Formation and destabilization of Kelvin-Helmholtz billows in stably stratified turbulence *Y. Kimura, J. Herring*	**L25.10** Regenerative growth due to axial flow induced by vortex-turbulence interaction *E. Stout, F. Hussain*		
L26. Reacting Flows VII: Experiments Room: 321 Chair: B. Chehroudi, Advanced Technology Consultants	**L26.07** Construction and Characterization of a Shock Tube for Ignition and Pollutant Formation Studies *C. Prykull, R. Dreiker, M. Fernandes, M. Eldeeb, B. Akih-Kumgeh*	**L26.08** WITHDRAWN .	**L26.09** Schlieren Imaging of Chemically-Induced Flow Instabilities During Step-Growth Polymerization *P. Bunton, M. Rawat, S. Stewart, A. De Wit, J. Pojman*			
L28. Biofluids: General VI - Fluid Film Flows Room: Spirit of Pittsburgh Ballroom B/C Chair: A. Hirsa, Rensselaer Polytechnic Institute	**L28.07** Dynamics of the Primary Cilium in an Oscillatory Flow *Y. Young*	**L28.08** The influence of nonpolar lipids on tear film dynamics *C. Breward*				
L30. Instability: Rayleigh-Taylor II Room: 408 Chair: D. Livescu, Los Alamos National Laboratory	**L30.07** Multicomponent Reynolds-Averaged Navier–Stokes Modeling of Blast-Driven Rayleigh–Taylor Instability Growth and Mixing *T. Finn, O. Schilling*	**L30.08** Multicomponent Reynolds-Averaged Navier–Stokes Modeling of Gas Channel Rayleigh–Taylor Mixing Experiments at Small and Intermediate Atwood Numbers *O. Schilling, T. Finn*	**L30.09** Mixing and turbulence generated by the tilted Rayleigh-Taylor instability *D. Livescu, T. Wei*	**L30.10** The Rayleigh-Taylor instability for a thin film on the inside of a horizontal cylinder *N. Hammoud, P. Trinh, P. Howell, J. Chapman, H. Stone*		

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L31. Free-Surface Flows III Room: 402 Chair: J. McHugh, U. of New Hampshire	**L31.07** CFD Experiments for Wind-Turbine-Platform Seakeeping Models and Flow Physics *A. Dunbar, E. Paterson, B. Craven, J. Brasseur*	**L31.08** Flow past a cylinder near a free surface *K. Delaney, M. Vanella, E. Balaras, A. Riaz*	**L31.09** Universal Froude number in a circular hydraulic jump, implication on the jump radius selection *A. Duchesne, L. Lebon, L. Limat*	**L31.10** SPH Simulation of Liquid Scattering from the Edge of a Rotary Atomizer *S. Izawa, T. Ito, M. Shigeta, Y. Fukunishi*		
L32. Geophysical: General I - Rotating Flows Room: 403 Chair: J. Chomaz, LadHyX, CNRS-Ecole Polytechnique	**L32.07** Direct numerical simulation of Coriolis effects on cylindrical gravity currents *M. Cantero, J. Salinas, T. Bonometti, E. Dari*	**L32.08** Spontaneous bending of a columnar vortex in stratified-rotating fluids *E. Yim, P. Billant*	**L32.09** A new regime of instability for the stably stratified Taylor-Couette flow *P. Billant, J. Park*	**L32.10** Laboratory Observation of Stratorotational Instability with a Large Density Gradient *B. Rodenborn, R. Ibanez, H. Swinney*		
L33. Drops XI: Levitation and Propulsion on Surfaces Room: 404 Chair: S. Mandre, Brown U.	**L33.07** Propelling a water drop with the vapor-mediated Marangoni effect *S. Kim, H. Kim*	**L33.08** Thermocapillary-driven motion of a droplet on an inclined substrate: contact line dynamics, and non-monotonic dependence of surface tension on temperature *G. Karapetsas, K. Sahu, K. Sefiane, O. Matar*	**L33.09** Pancake droplets on the grill: Thermocapillary motion of confined droplets in Hele-Shaw cells *M. Habisreutinger, F. Gallaire, P. Brun, M. Nagel*	**L33.10** Thermocapillary flow induced by the optical irradiation of carbon nanoparticles *J. Velez Cordero, J. Hernandez Cordero*		
L34. Drops XII: Elastic Surfaces and Fibers Room: 405 Chair: S. Das, U. of Alberta	**L34.07** Wetting and drying of liquid on crossed fibers *A. Sauret, A. Bick, H. Stone*	**L34.08** Drops moving along and across a filament *R. Sahu, S. Sinha-Ray, A. Yarin, B. Pourdeyhimi*	**L34.09** Drops in wedges *E. Reyssat*	**L34.10** Snail droplets: How fast is a flattened droplet transported by a more viscous wetting carrier fluid in a thin microchannel? *F. Gallaire, M. Nagel*		
L35. Chaos, Fractals and Dynamical Systems III: Miscellaneous Topology and Model Characterization Room: 406 Chair: S. Brunton, U. of Washington	**L35.07** Bifurcation analysis of an oscillating cylinder wake *M. Chu Cheong, J. Tu, C. Rowley*	**L35.08** Probing the dynamics of Rayleigh-Bénard convection using numerical simulations for the conditions of experiment *M. Xu, J. Tithof, M. Kramar, B. Suri, V. Nanda, M. Schatz, K. Mischaikow, M. Paul*	**L35.09** Chaotic flow and the finite-time Lyapunov exponent: Competitive autocatalytic reactions in advection-reaction-diffusion systems *R. Lueptow, C. Schlick, P. Umbanhowar, J. Ottino*	**L35.10** On a novel approach to anomalous transport in turbulent fluid and plasma *D. Datta*		
L36. Flow Control VI: Systems and Mechanisms Room: 407 Chair: J. Kuhlman, West Virginia U.	**L36.07** Control of fully turbulent pipe flow *J. Kuehnen, B. Hof*	**L36.08** Nonlinear switched models for control of unsteady forces on a rapidly pitching airfoil *S. Dawson, S. Brunton, C. Rowley*	**L36.09** Transformation of steady fluid flow, in porous media, into a pulsed fluid flow; experiment findings and mathematical modeling *H. Tavossi*	**L36.10** A dynamic observer to capture perturbation energy in noise amplifiers *J. Guzman, D. Sipp, P. Schmid*		

Tuesday, 26 November 2013
Sessions M – R

Tuesday Morning, 26 November 2013						
Session	**08:00**	**08:13**	**08:26**	**08:39**	**08:52**	**09:05**
M1. Geophysical: General II - Stratified Flows Room: 323 Chair: P. Hassanzadeh, U. of California, Berkeley	**M1.01** The Oceanic Charney Problem *S. Keating, K. Smith*	**M1.02** Global instabilities of internal gravity waves *G. Lerisson, S. Ortiz, J. Chomaz*	**M1.03** A Unified Model of Geostrophic Adjustment and Frontogenesis *J. Taylor, C. Shakespeare*	**M1.04** Turbulent mixing in stratified wall-bounded turbulent flows *S. Venayagamoorthy, F. Karimpour*	**M1.05** Lilly mechanism versus Zigzag instability in the destabilisation of a stratified turbulent flow initially uniform on the vertical *J. Chomaz, C. Arratia*	**M1.06** Buoyant Jets in Stratification; Mixing Efficiencies, Entropy Conditions and Wall Effects *C. Tzou, R. Camassa, M. Durbin, R. McLaughlin, J. Ward, C. Whetstone, B. White*
M2. Convection and Buoyancy-Driven Flows VI: Turbulent Convection Room: 324 Chair: R. Baghaei Lakeh, U. of California, Los Angeles	**M2.01** Including APE in the energy budget of turbulent Rayleigh-Bénard convection *R. Griffiths, B. Gayen, G. Hughes*	**M2.02** Turbulent plumes of unequal strength in a ventilated filling-box - thermal overshoots and bulk overturning *A. Shrinivas, G. Hunt*	**M2.03** Investigation of Transient, Turbulent Natural Convection in Vertical Tubes for Thermal Energy Storage in Supercritical CO_2 *R. Baghaei Lakeh, A. Lavine, H. Kavehpour, R. Wirz*	**M2.04** Small scale anisotropy in mixed convective turbulence *H. Einarsson, A. Scagliarini, L. Bouhlali, A. Gylfason, F. Toschi*	**M2.05** Using a Lagrangian dynamic subgrid-scale method to model turbulent thermal convection *N. Foroozani, J. Niemela, K. Sreenivasan, V. Armenio*	**M2.06** Nematic - isotropic phase transition in turbulent thermal convection *G. Ahlers, S. Weiss*
M3. Multiphase Flows VII Room: 325 Chair: C. Blake Ivey, Stanford U.	**M3.01** Improved volume of fluid method based on polyhedral streamtubes and embedded height functions *C. Ivey, P. Moin*	**M3.02** Generalization of the Volume-of-Fluid method with realizable and planarity preserving transport of geometric moments *V. Le Chenadec*	**M3.03** A Conservative Level Set Method on an Overset High-Resolution Cartesian Grid *M. Gale, M. Herrmann*	**M3.04** Entrainment Characteristics for variable-angle plunging liquid jets *S. Deshpande, M. Trujillo*	**M3.05** The effect of residence time on the dynamics of a condensating aerosol in a Hiemenz-type stagnation flow *A. Alshaarawi, K. Zhou, G. Scribano, A. Attili, F. Bisetti*	**M3.06** Three-dimensional advected normals method for calculating interfacial normals and curvatures in two-phase flows *A. Pathak, M. Raessi*
M4. Turbulence: Modeling IV Room: 326 Chair: S. K. Lele, Stanford U.	**M4.01** A subfilter-scale stress model for large eddy simulations *A. Rouhi, U. Piomelli*	**M4.02** Grid-independent large-eddy simulation (LES) of turbulent flow around a circular cylinder using explicit filtering *S. Singh, D. You*	**M4.03** LES of three-dimensional, shear-driven turbulent wall flow at $Re_\tau \approx 2000$ using a nested-LES wall-modeling approach *Y. Tang, R. Akhavan*	**M4.04** Turbulence Shell Models for Initial and Inflow Conditions in Direct and Large-Eddy Simulations *T. Drozda, J. White, R. Rubinstein*	**M4.05** Subgrid model evaluation through lockstep DNS/LES of a turbulent jet *A. Bhagatwala, V. Raman, J. Chen*	**M4.06** Experimental study of the SGS pressure-strain-rate correlation in the convective atmospheric surface layer *K. Nguyen, C. Tong*
M5. CFD VII: Numerical Methods I Room: 327 Chair: D. Haworth, Pennsylvania State U.	**M5.01** Using Adjoint-Based Approach to Understand Flapping-Wing Aerodynamics *M. Xu, M. Wei*	**M5.02** Adjoint-based optimal control for black-box simulators enabled by model calibration *H. Chen, Q. Wang, H. Klie*	**M5.03** Fluid structure interaction based on a fictitious domain method *A. Roshchenko, P. Minev, W. Finlay*	**M5.04** A Monolithic Algorithm for High Reynolds Number Fluid-Structure Interaction Simulations *E. Lieberknecht, J. Sheldon, J. Pitt*	**M5.05** Partitioned fluid-structure interaction scheme for bodies with high flexibility *T. Fitzgerald, M. Vanella, E. Balaras, B. Balachandran*	**M5.06** Richardson Extrapolation using DNAD *I. Celik, H. Sezer, S. Pakalapati*
M6. Microfluids: Electrokinetics Room: 328 Chair: A. Mani, Stanford U.	**M6.01** High Order WENO Simulation of Electrokinetic Instability in a Cross-Shaped Microchannel *Q. Li, Y. Delorme, S. Frankel*	**M6.02** Electro-osmotic Flow over a Charged Super-hydrophobic Surface *H. Zhao*	**M6.03** Modification of the local electric field around a sharp corner due to surface conductance *H. Wei, D. Halpern*	**M6.04** Electrokinetic instability of isotachophoresis shocks *G. Garcia, J. Santiago, A. Mani*	**M6.05** Electrokinetic instability and hydrodynamic chaos near electrodes *S. Davidson, M. Andersen, A. Mani*	**M6.06** Streaming potential and conductivity measurements reveal electrokinetic properties of porous and charged layers *A. Barbati, B. Kirby*
M7. Nanofluids II Room: 329 Chair: R. Sadr, Texas A&M U. at Qatar	**M7.01** A Statistical Perspective on the Effects of Brownian Particle Movements on the Induced Fluid Flow Field *W. Cheng, R. Sadr*	**M7.02** Non-additive entrance effects in ionic conductance of an array of solid-state nanopores *A. Gadaleta, C. Sempere, S. Gravelle, R. Fulcrand, A. Siria, L. Bocquet*	**M7.03** Rheological assessment of nanofluids at high pressure high temperature *A. Kanjirakat, R. Sadr*	**M7.04** Automated Characterization and Sorting of Nanowires by Solution-Based Electro-Orientation Spectroscopy *C. Akin, J. Shan*	**M7.05** Collective alignment of nanorods in thin Newtonian films *Y. Gu, R. Burtovyy, J. Townsend, J. Owens, I. Luzinov, K. Kornev*	**M7.06** Correlation between translational and rotational diffusion of a Janus nanoparticle in explicit solvent: A molecular dynamics simulation study *A. Kharazmi, N. Priezjev*
M8. General Fluid Dynamics II: Theory I Room: 330 Chair: M. Hoefer, North Carolina State U.	**M8.01** Size-Dependent Fluid Mechanics *A. Hadjesfandiari, A. Hajesfandiari, G. Dargush*	**M8.02** An Implicit Immersed Boundary Method for Low Reynolds Number Incompressible Flows *H. Park, C. Lee, J. Choi*	**M8.03** Anisotropy in RT flows *Y. Zhou, W. Cabot*	**M8.04** Interfacial dynamics of dissolving objects in fluid flow *C. Rycroft, M. Bazant*	**M8.05** Low-dimensional modelling of high-Reynolds-number shear flows incorporating constraints from the Navier-Stokes equation *M. Balajewicz, E. Dowell, B. Noack*	**M8.06** Stratified Euler flows in a channel and conservation laws *G. Ortenzi, R. Camassa, S. Chen, G. Falqui, M. Pedroni*
M9. Instability: Interfacial and Thin-Film VI - Fingering Room: 333 Chair: .	**M9.01** Stability Results on Multi-Layer Hele-Shaw Flows *C. Gin, P. Daripa*	**M9.02** A Solutal Fingering Instability during Capillary Imbibition in Porous Media *C. Guido, N. Young, W. Ristenpart*	**M9.03** Magnetically induced solitons in a Hele-Shaw cell *S. Lira, J. Miranda*	**M9.04** Effect of transient interfacial tension on miscible viscous fingering *M. Mishra, S. Pramanik*	**M9.05** Strong sample solvent and viscous fingering effects on the dynamics of adsorbed solutes *C. Rana, A. De Wit, M. Martin, M. Mishra*	**M9.06** Wavelength selection in injection-driven Hele-Shaw flows: A maximum amplitude criterion *E. Dias, J. Miranda*

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M10. Instability: General III - Stratified and Planar Flow, Cavity Flow and Periodic Orbits Room: 334 Chair: R. Govindarajan, Tata Institute of Fundamental Research	**M10.01** Self-Sustained Oscillations of Flow Past Sequential Cavities: Effects of Gravity Wave Coupling *B. Tuna, D. Rockwell*	**M10.02** Fast and slow transition to turbulence in plane Poiseuille flow *B. Eckhardt, S. Zammert*	**M10.03** Stability Analysis of High-Speed Cavity Flow *Y. Sun, K. Taira, L. Cattafesta, G. Bres, L. Ukeiley*	**M10.04** Unstable periodic orbits in a homogeneous shear flow *A. Sekimoto, S. Dong, J. Jiménez*	**M10.05** Experimental Investigation of Fluid-Structure Interactions in Compressible Cavity Flows *J. Wagner, K. Casper, S. Beresh, P. Hunter, R. Spillers, J. Henfling, R. Mayes*	**M10.06** The genesis of streamwise-localized solutions from globally periodic travelling waves in pipe flow *M. Chantry, A. Willis, R. Kerswell*
M11. Non-Newtonian Flows II Room: 335 Chair: S. Kieweg, U. of Kansas	**M11.01** Electrokinetic particle motions in non-Newtonian fluids through a microchannel contraction *X. Lu, S. Joo, S. Qian, X. Xuan*	**M11.02** Reversibility and Chaos in Microscopic Fluid Systems *L. Rosenfeld, L. Fan, S. Tang*	**M11.03** A Computational Study of Viscoelastic Effects on Drop Dynamics in Microchannels *D. Izbassarov, M. Muradoglu*	**M11.04** Falling Film Flow of Slag *L. Miao, W. Wu, N. Aubry, M. Massoudi*	**M11.05** Modeling flow of nematic liquid crystal down an incline *M. Lam, L. Cummings, T. Lin, L. Kondic*	**M11.06** Influence of yield stress and shear thinning on the capillary ridge formation of gravity-driven Herschel-Bulkley fluid on an incline *M. Anwar, B. Hu, K. Camarda, S. Kieweg*
M12. Vortex Dynamics and Vortex Flows IX Room: 336 Chair: K. Mohseni, U. of Florida	**M12.01** On relation between scalar interfaces and vorticity in inviscid flows *O. Ramesh, S. Patwardhan*	**M12.02** Inviscid Damping of Vortex Asymmetries by a Critical Layer Flux *C. Driscoll, A. Kabantsev, C. Chim, T. O'Neil*	**M12.03** Point vortex modeling of symmetric four vortex wakes *S. Basu, M. Stremler*	**M12.04** Topological Classification of Periodic Solutions to the Point Vortex Model *S. Smith*	**M12.05** Desingularized propagating vortex equilibria *S. Llewellyn Smith*	**M12.06** Extreme Vortex States and the Growth of Palinstrophy in Two Dimensions *D. Ayala, B. Protas*
M13. Granular Flows IV: Mixing, Segregation and Separation Room: 301 Chair: K. Hill, U. of Minnesota	**M13.01** Diffusion in linearly sheared granular packing *J. Dijksman, J. Ren, R. Behringer*	**M13.02** Rate-Based Particle Separation: A Granular "Chromatograph" *D. Lievano, J. McCarthy*	**M13.03** Modeling segregation of bidisperse granular materials: A parametric study *C. Schlick, Y. Fan, P. Umbanhowar, J. Ottino, R. Lueptow*	**M13.04** Segregation of Particles by Size and Density in Dense Sheared Flows: Gravity, Temperature Gradients, and Stress Partitioning *D. Tan, K. Hill*	**M13.05** Modeling segregation of bidisperse granular materials: Model development *Y. Fan, C. Schlick, P. Umbanhowar, J. Ottino, R. Lueptow*	**M13.06** Flow modulation based control of granular stratification in heaps *P. Umbanhowar, Y. Fan, D. McDonald, J. Ottino, R. Lueptow*
M14. Rotating Flows I Room: 302 Chair: Y. Jaluria, Rutgers U.	**M14.01** Small Ekman number heat transport in low Prandtl number rotating thermal convection *R. Ecke, J. Niemela*	**M14.02** Rotating thermal convection at low Prandtl numbers *S. Weiss, G. Ahlers*	**M14.03** Ekman and Taylor Vortices' Destruction and Mixing Enhancement in a Taylor–Couette System With Free Surface *H. Oualli, H. Belkadi, A. Abdelali, A. Bouabdallah, M. Gad-el-Hak*	**M14.04** Stability of the Taylor-Couette flow under a radial thermoelectric body force *H. Yoshikawa, I. Mutabazi, O. Crumeyrolle, A. Meyer*	**M14.05** Secondary Floquet modes of instability in Taylor-Couette flow with axial and radial through-flows *D. Martinand, E. Serre, R. Lueptow*	**M14.06** Experimental Study of the Flow in a Rotating CVD Reactor *S. Wong, J. Meng, Y. Jaluria*
M16. Microfluids: General Room: 304 Chair: A. Terrence Conlisk, Ohio State U.	**M16.01** Analysis of bolus formation from the micropipette ejection systems *D. Meng, P. Mirbod*	**M16.02** Diffusion-limited current to an ion-selective membrane: The role of water splitting and an extended space charge region *C. Nielsen, H. Bruus*	**M16.03** Deionization shocks in flat and thin microchannels *S. Alizadeh, M. Andersen, A. Mani*	**M16.04** On Taylor dispersion in liquid-cooled electronics applications *B. Tilley*	**M16.05** Characterization of Heat Transfer in Superhydrophobic Microchannels under Different Wetting Modes *T. Kim, C. Hidrovo*	**M16.06** Mesoscopic modeling of non-isothermal fluid systems *Z. Li, Y. Tang, B. Caswell, G. Karniadakis*
M17. Biofluids: Locomotion VIII - Bats and Butterfly Flight Room: 305 Chair: H. Dong, U. of Virginia	**M17.01** Understanding the energy economy of a batoid-inspired flexible fin *F. Bremer, S. Chiazza, A. Smits*	**M17.02** The effect of aspect ratio on the generation of lift and drag of a compliant membrane flapping wing *C. Schunk, K. Michaelson, T. Paine, S. Swartz, K. Breuer*	**M17.03** Deconstructing the Essential Elements of Bat Flight *D. Tafti, K. Viswanath, N. Krishnamurthy*	**M17.04** Lift and thrust generation by a butterfly-like 3D flapping wing model *K. Suzuki, T. Inamuro*	**M17.05** A Simple Analytical Model for Batoid Wake topology and Propulsive Forces *P. Valdivia y Alvarado, K. Srivatsa*	**M17.06** Investigation into the Role of Dragonfly Wing Flexibility During Passive Wing Pitch Reversal *Y. Bajwa, V. Williams, Y. Ren, H. Dong*
M18. Biofluids: General VII - Biofilms Room: 306/307 Chair: K. Drescher, Princeton U.	**M18.01** A framework to understand cell type transitions in bacterial biofilms *A. Seminara, N. Sinha, J. Wilking, S. Koelher, M. Cabeen, D. Weitz, M. Brenner*	**M18.02** Measurement of fluid dynamic loading on staphylococci bacteria bio-film structures using μPIV *E. Sherman, D. Moormeier, K. Bayles, J. Davidson, S. Ryu, T. Wei*	**M18.03** Kinetic theory for actively streaming microtubule suspensions *T. Gao, R. Blackwell, M. Glaser, M. Betterton, M. Shelley*	**M18.04** Mathematical Modeling of Tear Film Break up Modes and Fluorescent Intensity *J. Siddique, R. Braun, C. Begley, A. Winkeler, P. King-Smith*	**M18.05** Physical solutions to the public goods dilemma in bacterial biofilms *K. Drescher, C. Nadell, H. Stone, N. Wingreen, B. Bassler*	**M18.06** Coupling Osmolarity Dynamics within Human Tear Film on an Eye-Shaped Domain *L. Li, R. Braun, T. Driscoll, W. Henshaw, J. Banks, P. King-Smith*
M19. Boundary Layers VII: Wind Turbine Interaction Room: 310/311 Chair: J. Brasseur, The Pennsylvania State U.	**M19.01** Turbulence-driven power fluctuations on a wind turbine: characterization in the spectral domain *L. Chamorro, N. Tobin, H. Kim, J. Kim*	**M19.02** Streamwise evolution of statistical events and the triple correlation in a model wind turbine array *K. Viestenz, R. Cal*	**M19.03** The effect of two-bladed and three-bladed wind turbine rotors on fluxes of kinetic energy *D. McKeon, A. Newman, M. Melius, R. Cal, L. Castillo*	**M19.04** Flow event classification via conditional statistics of PIV data in a model wind turbine array *D. Knowles, R. Cal*	**M19.05** The Structure of the Wind Turbine Array/ Atmospheric Boundary Layer Interface *L. Castillo, J. Newman*	**M19.06** Kinetic Energy Transport in a Vertical-Axis Wind Turbine Array *M. Kinzel, D. Araya, J. Dabiri*

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M20. Instability: General IV Room: 315 Chair: J. Cressman, George Mason U.	**M20.01** Localized convection in a rotating system *C. Beaume, H. Kao, E. Knobloch, A. Bergeon*	**M20.02** Electro-convective instability at an ion-selective membrane *M. Andersen, C. Druzgalski, J. Nichols, A. Mani*	**M20.03** One-way Euler equations: a novel spatial marching technique for convective instabilities *A. Towne, T. Colonius*	**M20.04** Doubly-shocked Richtmyer-Meshkov Instability *V. Karkhanis, P. Ramaprabhu*	**M20.05** Numerical Simulations of the Single-mode, Reacting Richtmyer-Meshkov Instability Using Detailed Chemistry *N. Attal, P. Ramaprabhu*	**M20.06** Behavior of embedded phase in shock-driven two-phase flow *G. Kuehner, P. Wayne, D. Olmstead, C. Corbin, T. Bernard, P. Vorobieff, C. Truman*
M21. Biofluids: Locomotion IX - Bacteria and Microswimmers I Room: 316 Chair: H. Fu, U. of Nevada - Reno	**M21.01** Induced Diffusion of Tracers in a Bacterial Suspension: Theory and Experiments *R. Soto, G. Mino, J. Dunstan, E. Clement, A. Rousselet*	**M21.02** Rheological and boundary effects on microswimmers *T. Montenegro-Johnson, D. Loghin, D. Smith*	**M21.03** Mixing by curved trajectories of microswimmers *D. Pushkin, J. Yeomans*	**M21.04** The signatures of microstructure in swimming properties of microorganisms in heterogeneous media *M. Jabbarzadeh, H. Fu*	**M21.05** Nutrient uptake in a suspension of squirmers *S. Kajiki, Y. Imai, T. Yamaguchi, T. Ishikawa*	**M21.06** Hydrodynamic interaction of bacterial flagella – flagellar bundling *S. Lim*
M22. General Fluid Dynamics III Room: 317 Chair: S. Pouya, Michigan State U.	**M22.01** Flow interaction between multiple cross-flow inlets in a horizontal pipe or channel *P. Jha, C. Smith, R. Metcalfe*	**M22.02** Direct numerical simulation of electrokinetic chaos driven by ion concentration polarization next to an ion-selective membrane *C. Druzgalski, M. Andersen, A. Mani*	**M22.03** Mixing Dynamics Between Water and Biofuels *A. Cotel, A. Demond, J. Lei, E. Green*	**M22.04** Measurement of Submerged Oil/Gas Leaks using ROV Video *F. Shaffer, G. de Vera, K. Lee, ˙Savas*	**M22.05** Experimental study of turbulence in isothermal jet impingement at intermediate plate spacings *D. Landfried, A. Valentino, S. Mazumdar, A. Jana, M. Kimber*	**M22.06** Aerodynamic damping of oscillating cantilevers from side walls in close proximity *A. Eastman, M. Kimber*
M23. Geophysical: Atmospheric III Room: 318 Chair: B. Marston, Brown U.	**M23.01** Statistically Steady-State Large Eddy Simulations of Subtropical Clouds With Time Varying Large Scale Forcing *K. Pressel, T. Schneider, J. Teixeira, Z. Tan*	**M23.02** Shear effects in the evaporatively driven cloud-top mixing layer *J. Mellado*	**M23.03** Sub-layers inside the entrainment zone of a dry, shear-free convective boundary layer *J. Garcia, J. Mellado*	**M23.04** Effect of systematic mode reduction on cloud formation and buoyancy transport in a model of moist turbulent convection *J. Schumacher, T. Weidauer*	**M23.05** Multiscale Eddy Simulation for Moist Atmospheric Convection *S. Stechmann, B. Stevens*	**M23.06** Direct numerical simulation of stationary homogeneous moist turbulence *D. Chung, G. Matheou*
M24. Compressible Flows II: Experimental Methods Room: 319 Chair: M. Hargather, New Mexico Institute of Mining and Technology	**M24.01** IR thermography measurements on roughness induced transition. *F. Avallone, F. Schrijer, G. Cardone*	**M24.02** Supersonic Jet Mixing with Vibrational Non-Equilibrium *H. Reising, U. KC, P. Varghese, N. Clemens*	**M24.03** Resolving turbulence in hypersonic flows using PIV *O. Williams, T. Nguyen, A. Smits*	**M24.04** Background-Oriented Schlieren Characterization of Explosions *C. Romo, M. Hargather*	**M24.05** Quantitative schlieren measurement of shock wave pressure profile *J. Tobin, M. Hargather*	**M24.06** Characterization of Magnetohydrodynamic (MHD) Shock Sensor using Schlieren Imaging *O. Rockwell, M. Hargather*
M25. Flow Control VII: Actuator Design and Analysis Room: 320 Chair: D. Ashpis, NASA	**M25.01** Single Dielectric Barrier Discharge Plasma Actuator Modelling using a Charge Transport Approach *T. Williams, T. Corke*	**M25.02** SDBD Plasma Actuator and Geometric Optimization for Optimal Flow Control of Wind Turbine Blades *T. Corke, T. Williams, A. Jemcov, J. Cooney*	**M25.03** Thrust Measurement of Dielectric Barrier Discharge (DBD) Plasma Actuators *D. Ashpis, M. Laun*	**M25.04** Efficiency of Flow Control Actuators *A. Seifert*	**M25.05** Numerical Simulation of Nanosecond Pulsed Dielectric Barrier Discharge Actuator for Flow Control *J. Zheng, Z. Zhao, J. Li, Y. Cui, B. Khoo*	**M25.06** Nonlinear model-order reduction for oscillator flows using POD-DEIM *M. Fosas de Pando, P. Schmid, D. Sipp*
M26. Reacting Flows VIII: General Room: 321 Chair: S. Stewart, U. of Illinois at Urbana-Champaign	**M26.01** Direct numerical simulation of turbulent autoigniting flames *R. Asaithambi, K. Mahesh*	**M26.02** Solution of variable-density edge flames by a homotopy method *K. Liao, M. Matalon, C. Pantano*	**M26.03** Log-Normality and Multifractal Analysis of Flame Surface Statistics *A. Saha, S. Chaudhuri, C. Law*	**M26.04** Reactive transport modeling of CO_2 inside a fractured rock: Implications of mass transfer and storage capacity *M. Alizadeh Nomeli, A. Riaz*	**M26.05** Rayleigh-Taylor Unstable Flames – Fast or Faster? *E. Hicks*	**M26.06** Thermal convection and gyrokinetic effects in inductively-coupled plasma-based lenses *M. Mortazavi, J. Urzay, A. Mani*
M28. Industrial Applications I Room: Spirit of Pittsburgh Ballroom B/C Chair: H. Marie, Youngstown State U.	**M28.01** Keeping a surface ice/frost free with electro-conducting water-repellent coatings *A. Das, S. Kapatral, C. Megaridis*	**M28.02** One-way water permeable valve via water-based superhydrophobic coatings *J. Mates, C. Megaridis*	**M28.03** Mixing of two miscible fluids at high Schmidt number *M. Simmons, F. Alberini, C. Pain, O. Matar*	**M28.04** Internal Concentration Polarization in Asymmetric Membrane in Forward Osmosis System *G. Gadelha, H. Gadelha, N. Hankins*	**M28.05** Optimizing cross-flow-filtration efficacy using variable wall permeabilities *J. Herterich, I. Griffiths, R. Field, D. Vella*	**M28.06** Fluid Mechanics of a High Performance Racing Bicycle Wheel *J. Mercat, B. Cretoux, F. Huat, B. Nordey, M. Renaud, F. Noca*
M30. Instability: General V - Elastic and Pulsating Flows Room: 408 Chair: T. Sayadi, Ecole Polytechnique	**M30.01** Saffman-Taylor Instability for a non-Newtonian fluid *P. Daripa*	**M30.02** Influence of Fluid, Solid, and Geometric Parameters on the Fluid-Structure Interaction Response and Stability of Flexible Lifting Surfaces *E. Chae, D. Akcabay, Y. Young*	**M30.03** Stability theory for the synchronized waving of marine grass *R. Singh, S. Mandre, A. Mahadevan, L. Mahadevan, M. Bandi*	**M30.04** Travelling waves and fold localization in hovercraft seals *A. Wiggins, S. Zalek, M. Perlin, S. Ceccio*	**M30.05** Geometric scaling of purely elastic instability in viscoelastic Taylor-Couette flow *C. Schaefer, A. Morozov, C. Wagner*	**M30.06** WITHDRAWN .

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Session	**08:00**	**08:13**	**08:26**	**08:39**	**08:52**	**09:05**
M31. Biofluids: Locomotion X - Non-Newtonian Fluids Room: 402 Chair: A. Robertson, U. of Pittsburgh	**M31.01** Enhanced diffusion of tracers in a bath of self-propelled particles *A. Morozov*	**M31.02** Swimming of wavy sheets in weakly viscoelastic fluids *A. Morozov*	**M31.03** Theory for propulsion and transport in an anisotropic fluid *T. Powers, M. Krieger, S. Spagnolie*	**M31.04** The forward undulatory locomotion of Ceanorhabditis elegans in viscoelastic fluids *A. Shen, X. Ulrich*	**M31.05** A mechanism for non-Newtonian swimming enhancement *Y. Man, E. Lauga*	**M31.06** Locomotion of microorganisms near a no-slip surface in a viscoelastic fluid *S. Yazdi, A. Ardekani, A. Borhan*
M32. Particle-Laden Flows VI: Direct Simulation and Turbulence Modulation Room: 403 Chair: S. Elghobashi, U. of California, Irvine	**M32.01** Evaluating multiphase turbulence statistics using mesoscale DNS of gravity-driven particle-laden flows *R. Fox, J. Capecelatro, O. Desjardins*	**M32.02** A study of turbulence modulation by particle clusters in dilute and moderately-dilute channel flows using mesoscale DNS *J. Capecelatro, O. Desjardins*	**M32.03** Modeling low-order structure functions for inertial particles in isotropic turbulence *A. Bragg, L. Collins*	**M32.04** Near-wall, particle-laden turbulent transport *D. Richter, P. Sullivan*	**M32.05** Particle-Resolved Direct Numerical Simulation of a Particle-Laden Mixing Layer *M. Mehrabadi, S. Tenneti, S. Subramaniam*	**M32.06** Direct numerical simulation of forward- and backward-in-time relative dispersion of inertial particles in high-Reynolds-number ($R_\lambda \approx 580$) turbulence *P. Ireland, A. Bragg, L. Collins*
M33. Drops XIII: Drop Impact on Dry Surfaces Room: 404 Chair: I. Bischofberger, U. of Chicago	**M33.01** Fast microdroplet impact: a high-detail investigation using novel experimental methods *C. Visser, P. Frommhold, S. Wildeman, C. Sun, D. Lohse*	**M33.02** Drop splash on a smooth, dry surface *G. Riboux, J. Gordillo, A. Korobkin*	**M33.03** Drop splash on a dry, smooth surface: theory *J. Gordillo, G. Riboux, A. Korobkin*	**M33.04** Numerical Simulation of Droplet Impact on Dry Solid Surfaces Using the Moment of Fluid Method *Y. Guo, Y. Lian, M. Sussman*	**M33.05** Viscous boundary layer in splashing drops *M. Chemama, R. Singh, M. Brenner, S. Mandre*	**M33.06** Swirls and splashes: pressure dependence of the airflow created by drop impact *I. Bischofberger, K. Mauser, B. Ray, T. Lee, S. Nagel*
M34. Drops XIV: Shape Dynamics and Confinement Room: 405 Chair: P. Vlahovska, Brown U.	**M34.01** Nonlinear Resonance of Mechanically Excited Sessile Drops *C. Chang, S. Daniel, P. Steen*	**M34.02** Experiments on the harmonic response of coupled droplets to pressure forcing *C. Tilger, J. Olles, A. Hirsa*	**M34.03** Shape deformation dynamics of acoustically pulsed functional pendant droplet undergoing burning *S. Basu, A. Miglani, R. Kumar*	**M34.04** Manipulating the breakup dynamics of a droplet by lading nanoparticles in the liquid phase *S. Basu, D. P, S. Chowdhuri*	**M34.05** Water Drop Shedding under Icing Conditions from Surfaces with Different Wettabilities *D. Mandal, A. Criscione, A. Amirfazli*	**M34.06** Oil droplet behavior at a pore entrance in the presence of crossflow: Implications for microfiltration of oil-water dispersions *T. Darvishzadeh, V. Tarabara, N. Priezjev*
M35. Turbulence: Shear Layers II - Experiments Room: 406 Chair: J. Katz, Johns Hopkins U.	**M35.01** Vorticity Based Intermittency in the Single Stream Shear Layer (SSSL) *J. Foss, K. Bade, R. Prevost, D. Neal*	**M35.02** Coherent structures and momentum transport at various scales above an array of multiscale structures *K. Bai, J. Katz, C. Meneveau*	**M35.03** Particle Image Velocimetry of a Supersonic Flow over a Finite-Width Rectangular Cavity *S. Beresh, J. Wagner, J. Henfling, R. Spillers, B. Pruett*	**M35.04** Nozzle Turbulent Boundary Layer Influence on Sound in a Mach 0.9 Jet *R. Fontaine, G. Elliott, J. Austin, J. Freund*	**M35.05** An experimental investigation of the shear-layer and acoustic sources produced by a leading edge slat *S. Wilkins, P. Richard, J. Hall*	**M35.06** Vortex Identification above the free-end of finite-height prisms and cylinders *R. Chakravarty, N. Rostamy, D. Bergstrom, D. Sumner*
M36. Geophysical: Oceanographic VII Room: 407 Chair: A. Ardekani, U. of Notre Dame	**M36.01** Experiments in Stably Stratified Wakes I: Measurement and Characterization of Mean and Fluctuating Quantities *X. Xiang, T. Madison, P. Sellappan, G. Spedding*	**M36.02** Experiments in stably stratified wakes II: The early wake behind a sphere *T. Madison, X. Xiang, P. Sellappan, G. Spedding*	**M36.03** Retention and entrainment effects: experiments and theory for porous spheres settling in sharply stratified fluids *S. Khatri, R. Camassa, C. Falcon, R. McLaughlin, J. Prairie, B. White, S. Yu*	**M36.04** Rapid distortion theory for mixing efficiency of a flow stratified by one or two scalars *C. Rehmann, J. Jefferson*	**M36.05** Reorientation of elongated particles at density interfaces *A. Doostmohammadi, A. Ardekani*	**M36.06** Stratified mixing by microorganisms *G. Wagner, W. Young, E. Lauga*

Tuesday Morning, 26 November 2013					
Session	**09:18**	**09:31**	**09:44**	**09:57**	**10:10**
M1. Geophysical: General II - Stratified Flows Room: 323 Chair: P. Hassanzadeh, U. of California, Berkeley	**M1.07** Jets generated by a sphere moving vertically in stratified fluids *H. Hanazaki, S. Okino, S. Nakamura, S. Akiyama*	**M1.08** 3D Zombie Vortices in Rotating Stratified Shear *P. Marcus, S. Pei, C. Jiang, P. Hassanzadeh, J. Barranco, D. Lecoanet*	**M1.09** Noise and Turbulence Generate 3D Zombie Vortices in Stably Stratified Rotating Shear Flows *S. Pei, P. Marcus, C. Jiang, P. Hassanzadeh, D. Lecoanet, J. Barranco*	**M1.10** Statistical Equilibrium and Inverse Cascades of vortical modes for rotating and stratified flows *C. Herbert, R. Marino, A. Pouquet*	**Refreshment Break**, 10:10–10:30 Exhibit Hall A
M2. Convection and Buoyancy-Driven Flows VI: Turbulent Convection Room: 324 Chair: R. Baghaei Lakeh, U. of California, Los Angeles	**M2.07** Increase of heat transfer efficiency and plume coherence induced by geometrical confinement in turbulent thermal convection *K. Xia, S. Huang, M. Kaczorowski, R. Ni*	**M2.08** Test of the anomalous scaling of passive temperature fluctuations in turbulent thermal convection *P. Tong, X. He, X. Shang*	**M2.09** Influence of thermal plumes on Lagrangian acceleration in thermally-driven turbulence *X. Li, R. Ni, S. Huang, K. Xia*	**M2.10** Conditional temperature statistics in anisotropic turbulent thermal convection for Rayleigh numbers up to 10^{15} *X. He, D. van Gils, E. Bodenschatz, G. Ahlers*	
M3. Multiphase Flows VII Room: 325 Chair: C. Blake Ivey, Stanford U.	**M3.07** Unifying binary fluid diffuse-interface models in the sharp-interface limit *D. Sibley, A. Nold, S. Kalliadasis*	**M3.08** Linear stability analysis of miscible two-fluid flow in a channel with velocity slip at the walls *S. Ghosh, R. Usha, K. Sahu*	**M3.09** Three-dimensional simulations of pressure-driven displacement flow of two immiscible liquids using a multiphase Lattice Boltzmann approach *P. Redapangu, K. Sahu, S. Vanka*	**M3.10** Analysis of the two-phase flow in the wake of a transom stern *K. Hendrickson, G. Weymouth, D. Yue*	
M4. Turbulence: Modeling IV Room: 326 Chair: S. K. Lele, Stanford U.	**M4.07** Higher-order moments and their modeling approximations in turbulent channel flow *E. Jeyapaul, G. Coleman*	**M4.08** Stochastic model representation of the energy transfers in turbulent channel flow *V. Kitsios, J. Sillero, J. Soria, J. Frederiksen*	**M4.09** Formulation of a $k-\omega$ based DDES model *K. Rudra Reddy, P. Durbin*		
M5. CFD VII: Numerical Methods I Room: 327 Chair: D. Haworth, Pennsylvania State U.	**M5.07** A balanced-force finite-element method for surface-tension-driven interfacial flows using interface-capturing approaches *Z. Xie, D. Pavlidis, J. Percival, J. Gomes, C. Pain, O. Matar*	**M5.08** Application of Kelvin's Inversion Theorem in mesh based numerical simulation of flows in unbounded domains *J. Russell*	**M5.09** Smoothed Particle Hydrodynamics Continuous Boundary Force method for Navier-Stokes equations subject to a Robin boundary condition *W. Pan, J. Bao, A. Tartakovsky*		
M6. Microfluids: Electrokinetics Room: 328 Chair: A. Mani, Stanford U.	**M6.07** Shear Flow induced Electrical Current Generation *C. Ohl, S. Gonzalez Avila, C. Song, L. Dung*	**M6.08** Probing electrokinetics in microchannels and nanochannels with electrochemical measurements *J. Schiffbauer, S. Park, G. Yossifon*	**M6.09** Geometric Modulation of Electro-Osmosis of the Second Kind in Micro-Nanochannel Interface Devices *G. Yossifon, N. Leibowitz, Y. Green, J. Schiffbauer, S. Park*	**M6.10** Characterization of electrochemical response of a hybrid micro-nanochannel system using computational impedance spectroscopy (CIS) *V. Nandigana, N. Aluru*	
M7. Nanofluids II Room: 329 Chair: R. Sadr, Texas A&M U. at Qatar	**M7.07** Molecular Dynamics of Reaction-Driven, Diffusiophoretic, Colloid Self-Propulsion *N. Sharifi-Mood, J. Koplik, C. Maldarelli*	**M7.08** Repulsion parameters for carbon nanotubes in water in Dissipative Particle Dynamics simulations *M. Vo, D. Papavassiliou*	**M7.09** Fast Rotation of a Single Water Molecule in Buckyball *A. Barati Farimani, Y. Wu, N. Aluru*	**M7.10** Electrophoretic mobility of spherical nanoparticles confined in nanochannels *Y. Liu, T. Wynne, S. Pennathur, C. Meinhart*	
M8. General Fluid Dynamics II: Theory I Room: 330 Chair: M. Hoefer, North Carolina State U.	**M8.07** Shock Waves in Dispersive Eulerian Fluids *M. Hoefer*	**M8.08** Wavelet-based Simulations of Unsteady Compressible Flows *E. Brown-Dymkoski, O. Vasilyev*	**M8.09** Non-uniqueness of solutions in asymptotically self-similar shock reflections *S. Lau-Chapdelaine, M. Radulescu*	**M8.10** Single series skewness representation for passive scalar advection in laminar pipe and channel flow *R. McLaughlin, F. Bernardi, R. Camassa, K. Mertens*	
M9. Instability: Interfacial and Thin-Film VI - Fingering Room: 333 Chair: .	**M9.07** Determining the number of fingers in the lifting Hele-Shaw problem *J. Miranda, E. Dias*				

Tuesday Morning, 26 November 2013					
Session	**09:18**	**09:31**	**09:44**	**09:57**	**10:10**
M10. Instability: General III - Stratified and Planar Flow, Cavity Flow and Periodic Orbits Room: 334 Chair: R. Govindarajan, Tata Institute of Fundamental Research	**M10.07** Transient growth of 3D perturbations in a stratified mixing layer flow *H. Vitoshkin*	**M10.08** Linear optimal perturbations of a stratified shear layer *A. Kaminski, J. Taylor*	**M10.09** Instability in viscosity-stratified free shear layer *K. Sahu, R. Govindarajan*	**M10.10** Absolute instability in viscoelastic mixing layers *P. Ray, T. Zaki*	**Refreshment Break**, 10:10–10:30 Exhibit Hall A
M11. Non-Newtonian Flows II Room: 335 Chair: S. Kieweg, U. of Kansas	**M11.07** The effect of the polymer relaxation time on the nonlinear energy cas- cade and dissipation of statistically steady and decaying homogeneous isotropic turbulence *P. Valente, C. da Silva, F. Pinho*	**M11.08** Chemically-reacting non-linear fluid with variable transport properties *K. Uguz, M. Massoudi*			
M12. Vortex Dynamics and Vortex Flows IX Room: 336 Chair: K. Mohseni, U. of Florida	**M12.07** Why is the Karman vortex street so stable to the pairing instability? *C. Arratia, S. Mowlavi, F. Gallaire*	**M12.08** Coherent Lagrangian vortices: The black holes of turbulence *G. Haller*	**M12.09** The life of a vortex knot (in experiment) *D. Kleckner, M. Scheeler, D. Proment, W. Irvine*		
M13. Granular Flows IV: Mixing, Segregation and Separation Room: 301 Chair: K. Hill, U. of Minnesota	**M13.07** Passive Separation of Granular Materials *J. McCarthy, D. Lievano*	**M13.08** Exotic patterns and convection control in a vibrated bed of binary granular mixtures *M. Alam, I. Ansari*	**M13.09** Suppression and emergence of granular segregation under cyclic shear *M. Harrington, J. Weijs, W. Losert*		
M14. Rotating Flows I Room: 302 Chair: Y. Jaluria, Rutgers U.	**M14.07** How barotropic and stable are differential-rotation cylindrical flows? *G. Sheard, T. Vo, L. Montabone*	**M14.08** Near-field flow characterization of isothermal coaxial swirling jet *S. R, A. Miglani, B. Choudhury, S. Basu*			
M16. Microfluids: General Room: 304 Chair: A. Terrence Conlisk, Ohio State U.	**M16.07** Modelling the extrusion of preforms for microstructured optical fibres *H. Tronnolone, Y. Stokes, D. Crowdy*	**M16.08** Stresses due to Relative Sliding between Particles Surrounded by an Electrolyte Solution with Application to Lithium-Ion Batteries *C. Zhang, A. Conlisk*	**M16.09** Stresses due to Squeeze Flow between Particles Surrounded by an Electrolyte Solution with Application to Lithium-Ion Batteries *A. Conlisk, C. Zhang*	**M16.10** PIV measurements of the transient fluid flow due to the adsorption of particles *N. Musunuri, P. Shah, I. Fischer, P. Singh*	
M17. Biofluids: Locomotion VIII - Bats and Butterfly Flight Room: 305 Chair: H. Dong, U. of Virginia	**M17.07** Analysis of Dragonfly Take-off Mechanism: Initial Impulse Generated by Aerodynamic Forces *R. Zhu, A. Bode-Oke, Y. Ren, H. Dong*	**M17.08** Force production of a hovering hummingbird *H. Luo, J. Song, T. Hedrick*	**M17.09** Investigation of sharp-turning mechanism of damselfly via motion kinematics and vortex dynamics *Y. Tsai, J. Yang*	**M17.10** The mechanism of body rotation in the flapping flight of butterflies *Y. Fei, J. Yang*	
M18. Biofluids: General VII - Biofilms Room: 306/307 Chair: K. Drescher, Princeton U.	**M18.07** Thin film drainage between pre-inflated capsules or vesicles *M. Keh, J. Walter, G. Leal*				
M19. Boundary Layers VII: Wind Turbine Interaction Room: 310/311 Chair: J. Brasseur, The Pennsylvania State U.	**M19.07** Development of a Scaled Smart Wind Farm *S. Pol, A. Taylor, D. Mckeon, L. Castillo, I. Perez, R. Beibei, J. Sheng, C. Westergaard, A. Burak, G. Araya, F. Hussain*				

Tuesday Morning, 26 November 2013					
Session	**09:18**	**09:31**	**09:44**	**09:57**	**10:10**
M20. Instability: General IV Room: 315 Chair: J. Cressman, George Mason U.	**M20.07** Multicomponent Reynolds-Averaged Navier–Stokes Simulations of Reshocked Richtmyer–Meshkov Instability and Turbulent Mixing: Reshock Time and Atwood Number Effects *T. Moran-Lopez, O. Schilling*	**M20.08** Linear and Nonlinear Simulations of the Richtmyer- Meshkov Instability in Magnetohydrodynamics *R. Samtaney, A. Baksh, S. Gao, V. Wheatley*	**M20.09** Dual role of surface friction on instabilities in a sheared granular fluid *B. Gayen, M. Alam*	**M20.10** Instability of laterally heated cylindrical convection *D. Sun, B. Wang*	**Refreshment Break**, 10:10–10:30 Exhibit Hall A
M21. Biofluids: Locomotion IX - Bacteria and Microswimmers I Room: 316 Chair: H. Fu, U. of Nevada - Reno	**M21.07** Hydrodynamic model of bacterial tumbling near a non-slip surface *J. Sheng, M. Molaei*	**M21.08** Swimming of a Ciliated Microorganism *H. Guo, E. Kanso*	**M21.09** Collective Swimming in a Suspension of Ellipsoidal Squirmers *K. Kyoya, D. Matsunaga, Y. Imai, T. Yamaguchi, T. Ishikawa*	**M21.10** Contribution of cell body to the thrust production of flagellate bacteria *B. Liu, T. Powers, K. Breuer*	
M22. General Fluid Dynamics III Room: 317 Chair: S. Pouya, Michigan State U.	**M22.07** Growth and Decay of Fully-Developed Dean Flow *J. Ault, J. Davis*	**M22.08** An analytical approach to fluid ratcheting in oscillatory boundary layer *J. Yu*	**M22.09** Multiple shock-induced luminescence in water *P. Quinto-Su*	**M22.10** Experimental and Computational Analysis of a Marine Mammal Research Tag *J. Morrida, K. Holmes*	
M23. Geophysical: Atmospheric III Room: 318 Chair: B. Marston, Brown U.	**M23.07** Laboratory study of orographic cloud-like flow *K. Singh, K. Sreenivas*	**M23.08** Study of microphysical and radiative properties of contrail cirrus using large-eddy simulations *R. Paoli, O. Thouron, D. Cariolle*	**M23.09** Large eddy simulations of Arctic mixed-phase clouds *C. Kaul, J. Teixeira, G. Stephens*	**M23.10** Turbulent Mixing at the Edge of a Cloud *R. Shaw, M. Beals, J. Fugal, B. Kumar, J. Lu, J. Schumacher, J. Stith*	
M24. Compressible Flows II: Experimental Methods Room: 319 Chair: M. Hargather, New Mexico Institute of Mining and Technology	**M24.07** Quantitative image processing of high-speed Schlieren of a hot supersonic jet *T. Ecker, D. Brooks, K. Lowe, W. Ng*	**M24.08** Turbulence measurements in high-speed flows using the Focusing Laser Differential Interferometer *M. Fulghum, G. Settles*	**M24.09** Synthetic streak images (x-t diagrams) from high-speed digital video records *G. Settles*	**M24.10** Plenoptic PIV: Towards simple, robust 3D flow measurements *B. Thurow, T. Fahringer*	
M25. Flow Control VII: Actuator Design and Analysis Room: 320 Chair: D. Ashpis, NASA	**M25.07** Structural Sensitivity for Estimating Actuator and Sensor Placement for Flow Control *M. Natarajan, J. Freund, D. Bodony*	**M25.08** Increasing Wind Turbine Power Generation Through Optimized Flow Control Design *J. Cooney, T. Williams, T. Corke*	**M25.09** Closed-loop turbulence control with machine learning methods *B. Noack, T. Duriez, L. Cordier, M. Segond, M. Abel, S. Brunton, M. Morzynski, J. Laurentie, V. Parezanovic, J. Bonnet*		
M26. Reacting Flows VIII: General Room: 321 Chair: S. Stewart, U. of Illinois at Urbana-Champaign	**M26.07** A constitutive theory of reacting electrolyte mixtures *M. Costa Reis, Y. Wang, A. Bono Maurizio Sacchi Bassi*	**M26.08** Laminar Flame Speed of Primary Reference Fuels and Gasoline Surrogates at Elevated Temperatures Measured with the Flat Flame Method *Y. Liao, W. Roberts*			
M28. Industrial Applications I Room: Spirit of Pittsburgh Ballroom B/C Chair: H. Marie, Youngstown State U.	**M28.07** Numerical simualtions of fouling in crude-oil processing *J. Yang, O. Matar*	**M28.08** Parametric Study on the Evolution of Thermal Patterns and Coherent Flow Structures in the Rotated Arc Mixer *O. Baskan, M. Speetjens, G. Metcalfe, H. Clercx*	**M28.09** Erosion resistance of pipe bends with bio-inspired internal surfaces *C. Zhang, O. Matar*		
M30. Instability: General V - Elastic and Pulsating Flows Room: 408 Chair: T. Sayadi, Ecole Polytechnique	**M30.07** Modal and Nonmodal Stability Analysis of Steady and Pulsatile Plane Poiseuille Flow *S. Toosi, H. Arbabi, K. Sadeghy*	**M30.08** Transition to turbulence in pulsating pipe flow *B. Hof, S. Warnecke, D. Xu*	**M30.09** Linear stability analysis of pipe Poiseuille flow for an Oldroyd-B fluid *A. Petrucci Orefice, G. Coppola, L. de Luca*	**M30.10** A Theoretical and Numerical Study of Flexible Flapping Dynamics in a Uniform Flow *R. Jaiman, P. Gurugubelli, J. Liu*	

Tuesday Morning, 26 November 2013					
Session	**09:18**	**09:31**	**09:44**	**09:57**	**10:10**
M31. Biofluids: Locomotion X - Non-Newtonian Fluids Room: 402 Chair: A. Robertson, U. of Pittsburgh	**M31.07** Non-Newtonian rotational swimming: experiments *S. Gomez, F. Godinez, R. Zenit, E. Lauga*	**M31.08** Undulatory Swimming in Fluids with Polymer Networks *D. Gagnon, X. Shen, P. Arratia*			**Refreshment Break**, 10:10–10:30 Exhibit Hall A
M32. Particle-Laden Flows VI: Direct Simulation and Turbulence Modulation Room: 403 Chair: S. Elghobashi, U. of California, Irvine	**M32.07** DNS of fully-resolved droplet-laden decaying isotropic turbulence *A. Ferrante, M. Dodd*	**M32.08** DNS of droplet motion in a turbulent flow *M. Rosso, S. Elghobashi*	**M32.09** Effect of flow straining on particle accelerations and distribution *A. Gylfason, C. Lee, L. Bouhlali, F. Toschi*	**M32.10** Segregation of heavy particles by gravitational force *Y. Park, C. Lee*	
M33. Drops XIII: Drop Impact on Dry Surfaces Room: 404 Chair: I. Bischofberger, U. of Chicago	**M33.07** Janus surfaces reveal the hidden face of splashing *A. Latka, M. Driscoll, S. Nagel*	**M33.08** Multiscale liquid drop impact on wettable and textured surfaces *S. Farokhirad, R. Zhang, J. Koplik, T. Lee*	**M33.09** Disintegration of a Round Liquid Jet due to Impact on a Superhydrophobic Surface *M. Jalaal, B. Stoeber*	**M33.10** Drop impacts on electrospun nanofiber membranes *R. Sahu, S. Sinha-Ray, A. Yarin, B. Pourdeyhimi*	
M34. Drops XIV: Shape Dynamics and Confinement Room: 405 Chair: P. Vlahovska, Brown U.	**M34.07** Oval track droplets racing to a circle: a generic behavior for confined droplets relaxation and a geometrical model *P. Brun, M. Nagel, F. Gallaire*	**M34.08** Simulations of drop transport through obstacle arrays *R. Zhang, J. Koplik*	**M34.09** New Large Length Scale Capillary Fluidics Investigations Using a Drop Tower *M. Weislogel, A. Wollman, B. Wiles*	**M34.10** Zero-gravity mean free surface curvature of a confined liquid in a radially-vaned container *Y. Chen, M. Callahan, M. Weislogel*	
M35. Turbulence: Shear Layers II - Experiments Room: 406 Chair: J. Katz, Johns Hopkins U.	**M35.07** Transition to turbulence in stratified shear flow: experiments in an inclined square duct *C. Meyer, P. Linden*	**M35.08** 3D Evolution of Turbulent Flow Structures in Taylor-Couette *S. Tokgoz, G. Elsinga, J. Westerweel*	**M35.09** The behavior of the wake behind a heated circular cylinder *M. Khashehchi, K. Hooman*		
M36. Geophysical: Oceanographic VII Room: 407 Chair: A. Ardekani, U. of Notre Dame	**M36.07** Turbulence structure of gravity and turbidity currents *S. Radhakrishnan, M. Schiller, E. Meiburg*				

Invited Session N27
10:30 – 11:05, Spirit of Pittsburgh Ballroom A
Chair: J. Philip Drummond, NASA Langley Research Center
Transverse Jet Shear Layer Instabilities And Their Control Ann Karagozian, University of California, Los Angeles

Invited Session N28
10:30 – 11:05, Spirit of Pittsburgh Ballroom B/C
Chair: Harry L. Swinney, University of Texas at Austin
Swimming And Running Through Sand: Resistive Force Theory In Granular Media Daniel Goldman, Georgia Tech

Mini Break, 11:05 – 11:10

Invited Session P27
11:10 – 11:30, Spirit of Pittsburgh Ballroom A
Chair: Jonathan Rothstein, University of Massachusetts at Amherst
Andreas Acrivos Dissertation Award: Turbulence And Internal Waves In Tidal Flow Over Topography Bishakhdatta Gayen, The Australian National University

Invited Session P28
11:10 – 11:30, Spirit of Pittsburgh Ballroom B/C
Chair: Malcolm J. Andrews, Los Alamos National Laboratory
Francois N. Frenkiel Award: Shock Structure In Shock-Turbulence Interactions Diego Donzis, Texas A&M University

Lunch Break, 11:30 – 13:05

Tuesday Afternoon, 26 November 2013						
Session	**13:05**	**13:18**	**13:31**	**13:44**	**13:57**	**14:10**
R1. Geophysical: General III - Open Channels and Sedimentation Room: 323 Chair: J. Abad, U. of Pittsburgh	**R1.01** Vortex dynamics of rectangular lateral cavities in open channel flows: Effects of the aspect ratio on mass transport and residence times *C. Escauriaza, K. Soto, C. Gonzalez, C. Wei, E. Mignot, N. Riviere*	**R1.02** Hydraulic jumps with upstream shear *K. Ogden, K. Helfrich*	**R1.03** Large-eddy simulation of density currents on inclined beds *S. Chawdhary, A. Khosronejad, G. Christodoulou, F. Sotiropoulos*	**R1.04** Large-eddy simulation of coupled turbulence, free surface, and sand wave evolution in an open channel *A. Khosronejad, F. Sotiropoulos*	**R1.05** A generalized shallow-water analysis of gravity currents in various cross-area channels for Boussinesq and non-Boussinesq systems *M. Ungarish*	**R1.06** Flow over interacting barchan dunes studied in a refractive-index-matched environment *Z. Tang, N. Jiang, G. Blois, J. Barros, J. Best, K. Christensen*
R2. Convection and Buoyancy-Driven Flows VII: Gravitational Effects and Flows Past Moving Bodies Room: 324 Chair: H. Burridge, U. of Cambridge	**R2.01** Effect of single silica gel particle adsorption on the transport processes in a humid air stream *A. Sanyal, S. Basu, P. Kumar*	**R2.02** The effect of noncondensables on the thermocapillary-buoyancy convection in volatile fluids *T. Qin, L. Anfinson, R. Grigoriev*	**R2.03** Gravity driven current during sessile drop coalescence on a surface *Y. Zhang, S. Oberdick, S. Garoff, S. Anna*	**R2.04** Long-Lasting Effect of Initial Configuration in Gravitational Spreading of Material Fronts *N. Zgheib, T. Bonometti, S. Balachandar*	**R2.05** Fountain behaviour from the frequency of fountain-top fluctuation and rise height *H. Burridge, G. Hunt*	**R2.06** Dynamic Separation on a Pitching and Surging Airfoil as a Model for Flow over Vertical Axis Wind Turbine Blades *R. Dunne, B. McKeon*
R3. Multiphase Flows VIII Room: 325 Chair: A. Rosato, New Jersey Institute of Technology	**R3.01** First particle acceleration measurements for a shocked multiphase flow at a new horizontal shock tube facility *G. Orlicz, A. Martinez, K. Prestridge*	**R3.02** Measurements of Multiphase Fluid Mixing Using Synchrotron X-Ray Fluorescence *A. Kastengren, B. Halls, T. Meyer*	**R3.03** Role of fluctuations in instability generation in gas-solid suspensions *S. Subramaniam, M. Mehrabadi, R. Kolakaluri, S. Tenneti*	**R3.04** Towards large-eddy simulation of multiphase flows using two-way coupled, Euler-Lagrangian methods *W. Horne, K. Mahesh*	**R3.05** Eulerian-Lagrangian Simulations of Bubbly Flows in A Vertical Square Duct *R. Liu, S. Vanka, B. Thomas*	**R3.06** Low Reynolds-number hydrodynamics of immersed fluid sheets *N. Ribe, B. Xu*
R4. Instability: Boundary Layers I - Surface Topography Room: 326 Chair: P. Ricco, The U. of Sheffield	**R4.01** Distributed Roughness and Transient Growth in a Flat Plate Boundary Layer *M. Kuester, E. White*	**R4.02** Appraisal of boundary layer trips for landing gear testing *P. McCarthy, G. Feltham, A. Ekmekci*	**R4.03** Discrete surface roughness effects on a blunt hypersonic cone in a quiet tunnel *N. Sharp, E. White*	**R4.04** Transmission coefficient of Tollmien-Schlichting waves undergoing small indentation/hump distortion *H. Xu, S. Sherwin, X. Wu*	**R4.05** Effect of low freestream turbulence on crossflow instabiltiy *S. Hosseini, A. Hanifi, D. Henningson*	**R4.06** Linear and nonlinear receptivity of the boundary layer in transonic flows *A. Ruban, M. Kravtsova, T. Bernots*
R5. CFD VIII: Numerical Methods II Room: 327 Chair: O. V. Vasilyev, U. of Colorado	**R5.01** High-order discontinuous-Galerkin simulations of flows over airfoils with curved boundaries *D. Nelson, G. Jacobs*	**R5.02** Extended Discontinuous Galerkin Methods for tow-phase flows *F. Kummer*	**R5.03** Eliminating resonances in the Galerkin-truncated Burgers and Euler equations using wavelet filtering *K. Schneider, R. Pereira, R. Nguyen van yen, M. Farge*	**R5.04** Model Order Reduction for the Coupled System of Flow and Moving Structure *H. Gao, M. Wei*	**R5.05** A Robust Integration Method for Stiff Transport Equations *J. Escobar, I. Celik*	**R5.06** Level Set Jet Schemes for Stiff Advection Equations *D. Salac, . Kolahdouz*
R6. Nanofluids III Room: 328 Chair: J. Shelton, Carnegie Mellon U.	**R6.01** Towards realistic multiscale molecular-continuum modelling of water flow through nanotube membranes *K. Ritos, M. Borg, D. Lockerby, S. Ivekovic, Y. Zhang, J. Reese*	**R6.02** Molecular dynamics study of instability of nano-liquid column *T. Yano, T. Murakami*	**R6.03** Study of contact line motion in two phase flow using molecular dynamics *J. Thalakkottor, K. Mohseni*	**R6.04** CO_2 separation using a porous graphene/IL membrane *J. Lee, N. Aluru*	**R6.05** Effect of air on water capillary flow in silica nanochannels *H. Zambrano, J. Walther, E. Oyarzua*	**R6.06** Dissimilar viscosity induced sample pre-concentration in elecrokinetic nanofluidic channels *D. Wink, E. Shelton, S. Pennathur, B. Storey*
R7. Multiphase Flows IX Room: 329 Chair: C. Harwood, U. of Michigan	**R7.01** Experimental Investigation of Ventilation of a Surface Piercing Hydrofoil *C. Harwood, F. Miguel Montero, Y. Young, S. Ceccio*	**R7.02** Influence of scaling effects in the ventilation of surface-piercing bodies *F. Miguel Montero, C. Harwood, Y. Young, S. Ceccio*	**R7.03** Forced drainage in a 2D foam in a microfluidic system using thermocapillary stress *M. Jullien, V. Miralles, B. Selva, J. Marchalot, I. Cantat*	**R7.04** COST Action FP1005 "Fibre suspension flow modelling" *C. Marchioli*	**R7.05** Draining a 2D foam in a microfluidic system using thermocapillary stress *M. Jullien, V. Miralles, B. Selva, J. Marchalot, I. Cantat*	**R7.06** An ensemble method for targeted adaptive observations applied to multiphase flows *Z. Che, F. Fang, J. Percival, G. Hewitt, C. Pain, O. Matar, M. Navon*
R8. General Fluid Dynamics IV: Theory II Room: 330 Chair: J. Dannenhoffer, Syracuse U.	**R8.01** Data Fusion for Fluid Dynamic Data *C. Ruscher, J. Dannenhoffer, M. Glauser*	**R8.02** Dynamics and Control of the 2-d Navier-Stokes Equations *N. Smaoui, M. Zribi*	**R8.03** K-Means Clustering for Data Visualization and Flow Interpretation: Inclined Jet in Crossflow Example *J. Ling, J. Bodart, F. Coletti, J. Eaton*	**R8.04** Covariant Formulation of Fluid Dynamics and Estakhr's Material Geodesic Equation, far down the Rabbit hole *A. Estakhr*	**R8.05** Spreading and atomization dynamics of ultrasonically excited droplets *R. Kumar, D. P, S. Basu*	
R9. Bubbles VI: Nanobubbles and Acoustics Room: 333 Chair: J. Feng, Massachusetts Institute of Technology	**R9.01** Generation and acoustic characterization of monodisperse lipid-coated microbubbles *M. Parrales, J. Fernandez, M. Perez-Saborid*	**R9.02** Theory and simulation of linear wave propagation in bubbly liquids accounting for direct bubble-bubble interactions *D. Fuster, H. Marcus, J. Conoir, T. Colonius, F. Coulouvrat*	**R9.03** Realtime Visualization of Surface Nanobubbles Formation *M. Arora, C. Chan, C. Ohl*	**R9.04** On the Surface Tension of Nanobubbles *H. Bau, J. Grogan, M. Norton, F. Ross*	**R9.05** Observations of Nanobubble Dynamics with Transmission Electron Microscopy *M. Mohan, M. Arora, U. Mirsaidov, C. Ohl*	

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R10. General Fluid Dynamics V Room: 334 Chair: P. Weidman, U. of Colorado	**R10.01** Slippery liquid-infused porous surfaces in fully developed pipe flow *H. Sulaimon, M. Lee, L. Hellström, B. Rosenberg, A. Smits, M. Hultmark*	**R10.02** Discharge Coefficients for Irregular Orifices *W. Huebsch, D. Gray, G. Thompson, P. Spaur*	**R10.03** Breaking the Symmetry with Flexible Blades: Part II *J. Cosse, D. Kim, L. Mueller, M. Gharib*	**R10.04** Experimental Investigation of Scalar Patterns in a Spatially Periodic Flow Field *H. Rajaei, O. Baskan, M. Speetjens , H. Clercx*	**R10.05** Leaping shampoo glides on a 500-nm-thick lubricating air layer *E. Li, S. Lee, J. Marston, A. Bonito, S. Thoroddsen*	**R10.06** A new effective macroscopic Stokes-Cahn-Hilliard formulation for immiscible fluids in porous structures *M. Schmuck, M. Pradas, G. Pavliotis, S. Kalliadasis*
R11. Non-Newtonian Flows III Room: 335 Chair: E. Johnsen, U. of Michigan	**R11.01** Numerical simulation of particle migration in rotating eccentric cylinders *B. Palmer, D. Meng, P. Mirbod*	**R11.02** Coarse-grained simulations of flow-induced morphology dynamics in dispersed graphene *Y. Xu, M. Green*	**R11.03** Stretch and relax: a viscoelastic filament that displays thixotropic yield stress behavior *Y. Renardy, H. Grant*	**R11.04** Ants cushion applied stress by active rearrangements *Z. Liu, J. Hyatt, N. Mlot, M. Gerov, A. Fernandez-Nieves, D. Hu*	**R11.05** Simulations of Shock Propagation in Viscoelastic Media *M. Rodriguez, E. Johnsen*	**R11.06** Viscoelastic Effects on Spraying and Fragmentation of Polymeric Solutions *B. Keshavarz, G. McKinley, E. Houze, J. Moore, M. Koerner*
R12. Vortex Dynamics and Vortex Flows X Room: 336 Chair: M. Leftwich, George Washington U.	**R12.01** Volumetric Velocity Fields Downstream of a 2-Bladed Turbine *D. Troolin*	**R12.02** Large-eddy simulations of a single vertical axis wind turbine *M. Rahromostaqim, A. Posa, E. Balaras, M. Leftwich*	**R12.03** An Actuator Curve Embedding Method to Model Wind Turbine Wakes *P. Jha, S. Schmitz*	**R12.04** Three-dimensional velocity measurements around a rotating vertical axis wind turbine *F. Coletti, K. Ryan, J. Dabiri, J. Eaton*	**R12.05** The wake of a single vertical axis wind turbine *D. Barsky, M. Leftwich*	**R12.06** Experimental investigation of the wake characteristics of flow-powered and motorized laboratory-scale wind turbines *D. Araya, J. Dabiri*
R13. Granular Flows V: Fluctuations and Instabilities Room: 301 Chair: B. Behringer, Duke U.	**R13.01** Granular Impact: Predicting Dynamics with a Collisional Model *A. Clark, A. Petersen, R. Behringer*	**R13.02** Instability in shocked granular gases *N. Sirmas, M. Radulescu*	**R13.03** Linear and nonlinear response in sheared soft spheres *B. Tighe*	**R13.04** Capillary-like Fluctuations of a Solid-Liquid Interface in a Non-Cohesive Granular System *N. Mujica, L. Luu, G. Castillo, R. Soto*	**R13.05** Nonlinear bounded convection and a phase separation instability in a dilute granular gas *P. Shukla, M. Alam*	**R13.06** Numerical simulation of unsteady chute flows of two-phase granular mixtures *C. Varsakelis, M. Papalexandris*
R14. Rotating Flows II Room: 302 Chair: S. Weiss, U. of Michigan	**R14.01** Boundary layers and global stability of laboratory quasi-Keplerian flow *E. Edlund, H. Ji*	**R14.02** Hydrodynamic turbulence in quasi-Keplerian rotating flows? *L. Shi, M. Avila, B. Hof*	**R14.03** Geometrical statistics of the vorticity vector in rotating turbulence *H. Clercx, L. Del Castello*	**R14.04** Torque scaling and number of states in turbulent Taylor-Couette flow *J. Peixinho, B. Martinez-Arias, I. Mutabazi*	**R14.05** Turbulence decay towards the linearly-stable regime of Taylor Couette *R. Ostilla Monico, S. Grossmann, R. Verzicco, D. Lohse*	**R14.06** Angular momentum transport and flow super-rotation in Rayleigh stable Taylor-Couette *F. Nordsiek, S. Huisman, R. van der Veen, C. Sun, D. Lohse, D. Lathrop*
R16. Aerodynamics V Room: 304 Chair: .	**R16.01** Unsteady Aerodynamics of Static Airfoils in Reverse Flow *A. Lind, A. Jones*	**R16.02** Experimental Investigation of Dynamic Stall on an Airfoil with Leading Edge Tubercles *J. Hrynuk, D. Bohl*	**R16.03** Flow Structure and Forces on an Airfoil Pitching Asymmetrically at High Reduced Frequency *P. Hammer, A. Naguib, M. Koochesfahani*	**R16.04** Influence of the vortex shedding on the time evolution of instantaneous pressure fields and forces in rotating airfoils *A. Villegas, F. Diez*	**R16.05** Aerodynamics of S809 Airfoil at Low and Transitional Reynolds Numbers *J. Carreras, N. Laal-Dehghani, S. Gorumlu, F. Mehdi, L. Castillo, B. Aksak, J. Sheng*	**R16.06** Large eddy simulation with periodic forcing of low-frequency flow oscillation near airfoil stall. *J. Almutairi, I. AlQadi, E. Eljack*
R17. Biofluids: Locomotion XI - Microswimmers and Bacteria II Room: 305 Chair: M. Mohebbi, U. of Pittsburgh	**R17.01** Microfluidic study of bacterial interactions and attachment to oil drops *G. Juarez, R. Stocker*	**R17.02** Turbulent flow from a microscopic organism's perspective: What does it feel like to be tiny in the ocean? *R. Pepper, E. Variano, M. Koehl*	**R17.03** Squirming At Finite Reynolds Number *N. Chisholm, Z. Zhu, A. Khair*	**R17.04** General Squirming Motion in a Stokes Flow *O. Pak, E. Lauga*	**R17.05** An efficient framework for qualitative and quantitative analysis of magnetically actuated, rigid microswimmers *F. Meshkati, U. Cheang, M. Kim, H. Fu*	**R17.06** Copepod Trajectory Characteristics in Thin Layers of Toxic Algal Exudates *D. Webster, A. True, M. Weissburg, J. Yen*
R18. CFD IX Room: 306/307 Chair: M. B. Nik, U. of Pittsburgh	**R18.01** Nonlinear optimisation of scalar mixing in plane Poiseuille flow with finite diffusivity *C. Caulfield, D. Foures, P. Schmid*	**R18.02** Simulation-based optimization using finite-time approximations of the infinite-time-average statistics *P. Beyhaghi, T. Bewley*	**R18.03** Determining wave resistance of a ship using a dissipative potential flow model *M. Fürth, M. Tan, Z. Chen*	**R18.04** Thermal Fluctuations in Smooth Dissipative Particle Dynamics simulation of mesoscopic thermal systems *N. Gatsonis, J. Yang*	**R18.05** Boundary conditions for coupling molecular dynamics simulations to continuum simulations *L. Herdman, Y. Dubief*	**R18.06** Patient Specific Multiscale Simulations of Blood Flow in Coronary Artery Bypass Surgery *A. Bangalore Ramachandra, S. Sankaran, A. Kahn, A. Marsden*
R19. Boundary Layers VIII: Experimental Room: 310/311 Chair: E. Longmire, U. of Minnesota	**R19.01** Large field of view multi-resolution experimental measurement of the spatial structure of a high Reynolds number turbulent boundary layer *N. Buchmann, C. Atkinson, C. de Silva, E. Gnanamanickam, N. Hutchins, J. Soria, I. Marusic*	**R19.02** Turbulence measurements in high Reynolds number boundary layers *M. Vallikivi, A. Smits*	**R19.03** Effect of pressure gradient fluctuations on boundary layer turbulence *P. Joshi, J. Katz, X. Liu*	**R19.04** Boundary layer response to periodic spanwise perturbation by an array of obstacles *Y. Tan, E. Longmire*	**R19.05** Latest Developments on Obtaining Accurate Measurements with Pitot Tubes in ZPG Turbulent Boundary Layers *H. Nagib, R. Vinuesa*	**R19.06** Experiments on rapidly-sheared wall turbulence *S. Diwan, J. Morrison*

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R20. Boundary Layers IX: Numerical Simulation Room: 315 Chair: N. Panchapakesan, Indian Institute of Technology Madras	**R20.01** Large eddy simulation study of the logarithmic law for high-order moments in turbulent boundary layers *R. Stevens, M. Wilczek, C. Meneveau*	**R20.02** Inertial Subrange Spectra in the Log-Law Layer of Turbulent Channel Flow *Y. Kaneda, K. Morishita, T. Ishihara*	**R20.03** Numerical experiments of thermal convection with shear *C. Hamman, P. Moin*	**R20.04** LES of spatially developing turbulent boundary layer over a concave surface *S. Arolla, P. Durbin*	**R20.05** The high-order statistics of APG turbulent boundary layers *Y. Maciel, A. Gungor, M. Simens, J. Soria*	**R20.06** The structure of APG turbulent boundary layers *A. Gungor, Y. Maciel, M. Simens, J. Soria*
R21. Biofluids: Locomotion XII - Microswimmers and Bacteria III Room: 316 Chair: J. Guasto, Tufts U.	**R21.01** Ferromagnetic and antiferromagnetic order in bacterial vortex lattices *H. Wioland, F. Woodhouse, J. Dunkel, R. Goldstein*	**R21.02** Magnetic Control of Rigid Achiral Microswimmers *U. Cheang, F. Meshkati, H. Fu, M. Kim*	**R21.03** Direct evidence of flagellar synchronization through hydrodynamic interactions *D. Brumley, M. Polin, K. Wan, R. Goldstein*	**R21.04** Feeding of swimming *Paramecium* with fore-aft asymmetry in viscous fluid *P. Zhang, S. Jana, M. Giarra, P. Vlachos, S. Jung*	**R21.05** Bacterial motility near crude oil and water interface *J. Rodríguez, M. Molaei, J. Sheng*	**R21.06** The phylogeny of swimming kinematics: The environment controls flagellar waveforms in sperm motility *J. Guasto, L. Burton, R. Zimmer, A. Hosoi, R. Stocker*
R22. DFD Minisymposium: Frontiers in Combustion Physics II Room: 317 Chair: J. Urzay, Stanford U.	**R22.01** Mixing in combustion *P. Dimotakis*		**R22.02** Highly Turbulent Counterflow Flames: A Laboratory Scale Benchmark for Practical Combustion Systems *A. Gomez*		**R22.03** Supersonic combustion *M. Gamba*	
R23. Biofluids: Physiological VI - Experimental Studies in Blood Flows Room: 318 Chair: A. Marsden, U. of California, San Diego	**R23.01** Dynamical systems characterization of inertial effects of fluid flow in a curved artery model under pulsatile flow forcing *M. Leggiero, K. Bulusu, M. Plesniak*	**R23.02** Pulse wave analysis in a 180-degree curved artery model: Implications under physiological and non-physiological inflows *K. Bulusu, M. Plesniak*	**R23.03** Secondary flow structures in the presence of Type-IV stent fractures through a bent tube model for curved arteries: Effect of circulation thresholding *S. Hussain, K. Bulusu, M. Plesniak*	**R23.04** Setup of a Biomedical Facility to Study Physiologically Relevant Flow-Structure Interactions *F. Mehdi, J. Sheng*	**R23.05** Effect of centrifugal forces on formation of secondary flow structures in a 180-degree curved artery model under pulsatile inflow conditions *S. Callahan, R. Sajjad, K. Bulusu, M. Plesniak*	**R23.06** Distant downstream steady-state flow studies of a mechanical heart valve: PIV study of secondary flow in a model aortic arch *B. Fix, C. Popma, K. Bulusu, M. Plesniak*
R24. Biofluids: Physiological VII - Human Voice System Flows Room: 319 Chair: L. T. Zhang, Rensselaer Polytechnic Institute	**R24.01** Study of dynamic fluid-structure coupling with application to human phonation *S. Saurabh, J. Faber, D. Bodony*	**R24.02** Fluid-Structure Interactions as Flow Propagates Tangentially Over a Flexible Plate with Application to Voiced Speech Production *A. Westervelt, B. Erath*	**R24.03** Flow in a Geometrically-Realistic, Vibrating Model of the Human Vocal Tract *S. Thomson, J. Seegmiller*	**R24.04** Vocal Fold Pathologies and Three-Dimensional Flow Separation Phenomena *A. Apostoli, K. Weiland, M. Plesniak*	**R24.05** Phonation aeroacoustic source strength estimation from sound pressure measurements *M. Krane, E. Campo, M. McPhail*	**R24.06** Glottal aerodynamics in compliant, life-sized vocal fold models *M. McPhail, G. Dowell, M. Krane*
R25. Flow Control VIII: Surface Modulation, Interface Speed and Other Effects Room: 320 Chair: B. J. McKeon, California Institute of Technology	**R25.01** The effect of mako sharkskin on laminar flow separation *M. Bradshaw, A. Lang, P. Motta, M. Habegger, R. Hueter*	**R25.02** Controlling turbulent boundary layer separation using biologically inspired 2D transverse grooves *A. Lang, E. Jones, F. Afroz*	**R25.03** A Novel Method to Induce Hydrodynamic Instability in Boundary Layer Flows *M. Gharib, D. Jeon, F. Pereira, B. McKeon*	**R25.04** Patterned Surface Roughness for Passive Transition Delay *R. Downs, J. Fransson*	**R25.05** Development of FDR-AF (Frictional Drag Reduction Anti-Fouling) Marine Coating *I. Lee, H. Park, H. Chun*	**R25.06** Speed of turbulent-laminar interfaces in pipe flow *D. Barkley, B. Song, M. Avila, B. Hof*
R26. Biofluids: Locomotion XIII - Bacteria/Flapping Room: 321 Chair: M. Jalali, Texas Tech U.	**R26.01** Turbulence-Copepod Interactions: Response of *Acartia tonsa* to Burgers Vortex *D. Young, D. Webster, J. Yen*	**R26.02** Visualizing viral transport and host infection *K. Son, J. Guasto, A. Cubillos-Ruiz, M. Sullivan, R. Stocker*	**R26.03** Bacterial locomotion, adsorption and growth over chemically patterned surfaces *M. Jalali, M. Molaei, J. Sheng*	**R26.04** Shear alters motility of *Escherichia coli* *M. Molaei, M. Jalali, J. Sheng*	**R26.05** Rheological behaviour of a suspension of microswimmers varying in motor characteristics *M. Tirumkudulu, R. Karmakar, R. Gulvady, K. Venkatesh*	**R26.06** Near wake features of a flying European Starling *A. Kirchhefer, G. Kopp, R. Gurka*
R28. Industrial Applications II Room: Spirit of Pittsburgh Ballroom B/C Chair: J. R. Buchanan Jr., Bechtel Marine Propulsion Corporation, Bettis Atomic Power Laboratory	**R28.01** Influence of Spatial Variations on the Flow Field and Power Production of a Model Wind Farm *A. Ramos, N. Hamilton, D. DeLucia, R. Cal*	**R28.02** Wind Turbine Gust Prediction Using Remote Sensing Data *P. Towers, B. Jones*	**R28.03** Detecting Unsteady Blade Row Interaction in a Francis Turbine using a Phase-Lag Boundary Condition *A. Wouden, J. Cimbala, B. Lewis*	**R28.04** Modified Design of Hydroturbine Wicket Gates to Include Liquid Control Jets *B. Lewis, J. Cimbala, A. Wouden*	**R28.05** Mixing and transport in a liquid metal electrode *D. Kelley, D. Sadoway*	**R28.06** Fluid flow in discrete fractures in Enhanced/Engineered Systems, consequences of interconnected fractures, buoyancy, and fracture roughness *D. Fox, D. Koch, J. Tester*
R30. Microfluids: Microchannels Room: 408 Chair: S. Ryu, U. of Nebraska, Lincoln	**R30.01** Noninvasive Measurement of the Pressure Distribution in a Deformable Micro-Channel *O. Ozsun, V. Yakhot, K. Ekinci*	**R30.02** Flow rate–pressure drop relation for deformable shallow microfluidic channels *I. Christov, V. Cognet, H. Stone*	**R30.03** Shear and Pressure Driven Flow in Microchannels *Y. Jaluria*	**R30.04** Momentum and mass transport over a superhydrophobic bubble mattress: the influence of interface geometry *P. Tsai, A. Haase, E. Karatay, R. Lammertink*	**R30.05** Flow Visualization of Superhydrophobic Microchannels under Different Wetting States *H. Leva, T. Kim, C. Hidrovo*	**R30.06** Spontaneous oscillations in simple fluid networks *D. Hellen, E. Weiler, N. Karst, J. Geddes, B. Storey*

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R31. Focus Session: Structure of Turbulent/Non-Turbulent Interface Room: 402 Chair: C. da Silva, IST-Technical U. of Lisbon	**R31.01** Multiscale geometry, scaling and fluxes at the turbulent/non-turbulent interface in high Reynolds number boundary layers *C. Meneveau, C. de Silva, J. Philip, K. Chauhan, I. Marusic*	**R31.02** Geometrical properties and scaling of the turbulent-nonturbulent interface in boundary layers *G. Borrell, J. Jiménez*	**R31.03** Structure of the turbulent/non-turbulent interface of turbulent boundary layers - DNS results *T. Ishihara, H. Ogasawara, J. Hunt*	**R31.04** A Comparison of the Scalar and Vorticity Criterion defining the T/NT Interface *J. Boschung, F. Hennig, N. Peters*	**R31.05** The strain field across the turbulent/non-turbulent interface *G. Elsinga, R. Taveira, C. Da Silva*	**R31.06** Lagrangian evolution of fluid particles in the vicinity of the turbulent non-turbulent interface of a turbulent boundary layer *C. Atkinson, P. Stegeman, J. Hackl, G. Borrell, J. Soria*
R32. Particle-Laden Flows VII: Computational Methods Room: 403 Chair: E. C. Keaveny, Imperial College of London	**R32.01** A computational scheme for simulation of dense suspensions of arbitrarily shaped rigid particles *M. Vanella, H. Ez Eldin, P. Mohapatra, C. Daley, A. Dubay, E. Balaras*	**R32.02** An investigation of particles suspension using smoothed particle hydrodynamics *A. Pazouki, D. Negrut*	**R32.03** Numerical simulation of two-way coupling mechanism in particle-laden turbulent flow based on one-dimensional turbulence model *G. Sun, D. Lignell, J. Hewson, C. Gin*	**R32.04** Incorporating Volumetric Displacement Effects In Euler-Lagrange Simulations of Particle-Laden Oscillatory Flows *S. Apte, J. Finn, A. Cihonski*	**R32.05** Fluctuating force-coupling method for simulating Brownian suspensions *E. Keaveny*	**R32.06** Particle-Laden Turbulent Kolmogorov Flow *L. Wang*
R33. Drops XV: Superhydrophobic Surfaces Room: 404 Chair: X. Yong, U. of Pittsburgh	**R33.01** Slide, Sweep and Vanish: Droplet manipulation by wettability engineering *A. Ghosh, R. Ganguly, T. Schutzius, C. Megaridis*	**R33.02** Dynamic Wetting of a Droplet on a Hydrophobic Micro-patterned Surface *X. Wei, H. Li, C. Wang, X. Tang, S. Hilgenfeldt, K. Hsia*	**R33.03** Simulations of Droplets on Micro-patterned Surfaces *B. Liu, M. Grigola, H. Li, S. Hilgenfeldt, K. Hsia*	**R33.04** Effect of Vapor Flow on Jumping Droplets during Condensation on Superhydrophobic Surfaces *D. Preston, N. Miljkovic, R. Enright, A. Limia, E. Wang*	**R33.05** Cold-induced Spreading of Water Drops on Hydrophobic Surfaces *F. Tavakoli, P. Kavehpour*	**R33.06** Direct observation of self-similar contact line depinning from superhydrophobic surfaces *A. Paxson, K. Varanasi*
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R36. Geophysical: Atmospheric IV Room: 407 Chair: B. Jayaraman, Pennsylvania State U.	**R36.01** Large-eddy simulations of the Ekman boundary layer over walls with variable temperatures: the complex implications of spatially-varying static stability *E. Bou-Zeid, S. Shah*	**R36.02** An LES Study of Transition in Atmospheric Boundary Layer Turbulence Structure from Neutral to Convective Stability States *B. Jayaraman, J. Brasseur*	**R36.03** Buoyancy effects on the mean velocity profile in atmospheric surface layer flows *S. Salesky, G. Katul, M. Chamecki*	**R36.04** Underactuated (bouyancy) control of sensor vehicle distributions in highly stratified flows *G. Meneghello, T. Bewley*	**R36.05** Vertical concentration profiles of dust particles in the atmospheric surface layer *L. Souza Freire Grion, M. Chamecki*	**R36.06** WITHDRAWN .

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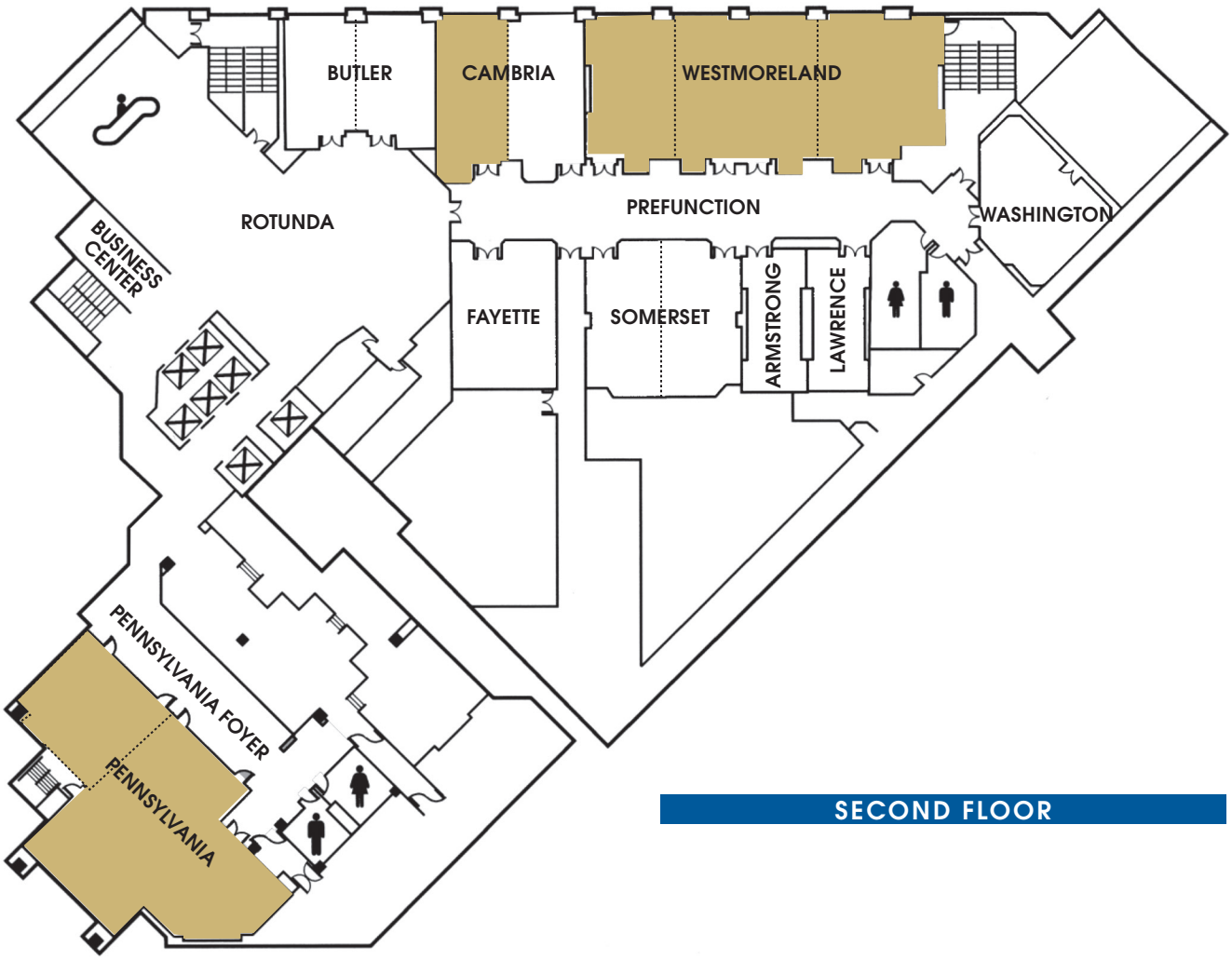
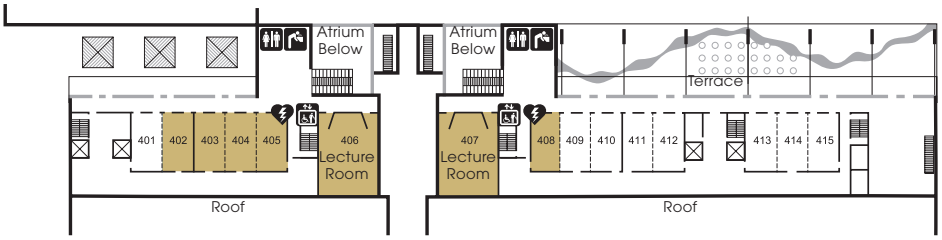
APS/DFD Meeting Rooms



David L. Lawrence Convention Center

APS/DFD Meeting Rooms and Meeting Events

FOURTH FLOOR



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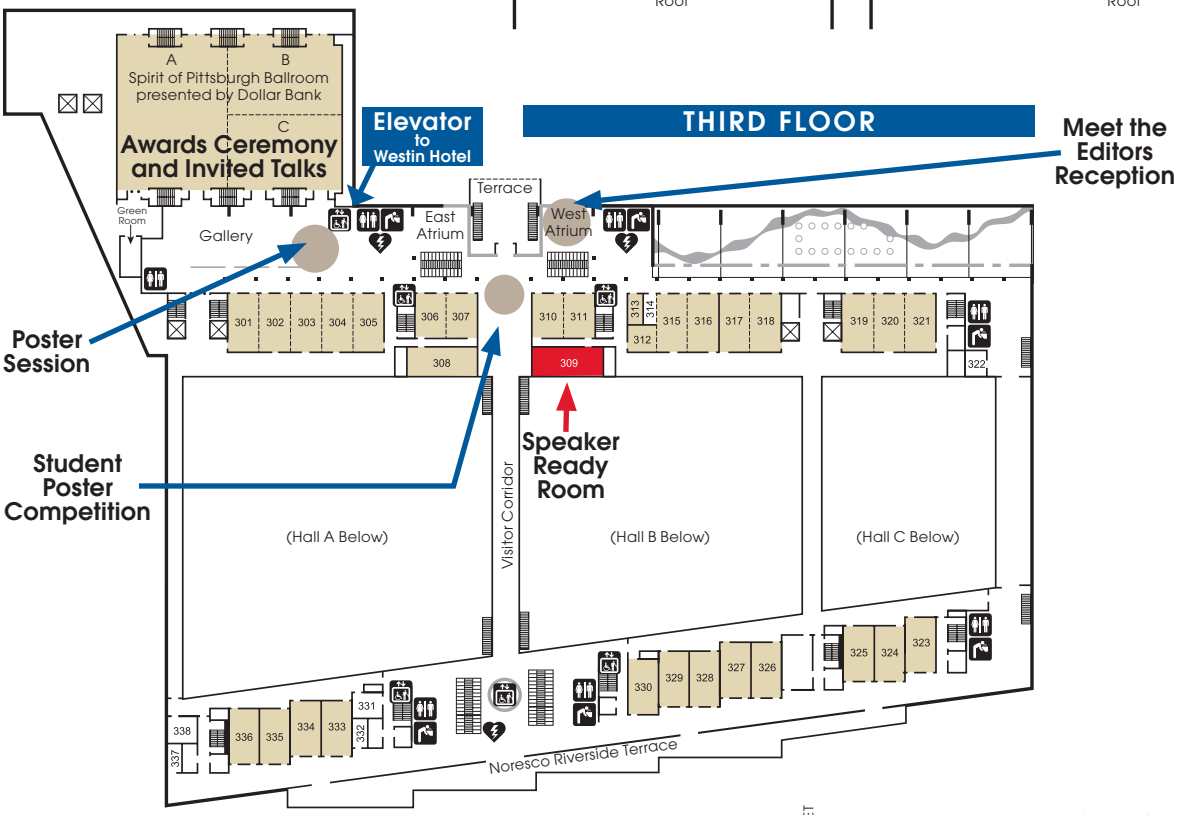

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