

New In 2019

New Saturday Start Date:
Sessions will run 4 days and begin November 23 from 3:00–6:00 pm.

Flash Presentations:
New this year, as an alternative to 12 minute presentations, presenters could opt to participate in a Flash Presentation sessions. Flash Presentations will take place on Monday afternoon from 3:20–4:16 pm in parallel on Level 6, Ballrooms 6A, 6B, 6C, and 6E. Each will consist of a 1-minute oral presentation, with each presenter having a single PowerPoint slide. Presenters will also bring a poster and participate in the poster session immediately following in the Exhibit Hall.



DFD2019 SEATTLE
72nd Annual Meeting of the American Physical Society Division of Fluid Dynamics
November 23-26, 2019

Seattle, WA November 23-26, 2019

The 72nd Annual Meeting of the American Physical Society’s Division of Fluid Dynamics (DFD) will be held in Seattle, WA on November 23-26, 2019. The meeting is being hosted by the University of Washington, particularly the Department of Aeronautics & Astronautics; the Department of Mechanical Engineering; and the Applied Physics Lab, Boeing, NorthWest Research Associates, Oregon State University, Portland State University, Saint Martin’s University, the University of British Columbia, and the University of Idaho.

Meeting Venue

Seattle, a city on Puget Sound in the Pacific Northwest, is surrounded by water, mountains, evergreen forests, and contains thousands of acres of parkland. Known as a port city, Seattle is Washington State’s biggest city, with the largest per capita share of technology-dependent jobs than any other U.S. state as it is the headquarters to both Microsoft and Amazon. The futuristic Space Needle, a 1962 World’s Fair legacy, is its most iconic landmark. Seattle has

more than 13 James Beard award winning chefs. It is the second largest wine grape-producing region in the U.S and is a leading city in the handcrafted beer renaissance. Seattle is the nation’s model city for recycling, it is one of six cities in the U.S. with a major symphony, opera, and ballet.

Located in the heart of downtown, the Washington State Convention Center will host the 72nd Annual Meeting of the Division of Fluid Dynamics and is walking distance from the waterfront as well as many shops and restaurants.

Hotel Accommodations

Our headquarters hotel, The Sheraton Grand, is the only hotel with our special rates not sold out.

Make your reservation by going to:

book.passkey.com/go/APSDFD2019

Or by contacting:

APS DFD Housing Bureau

Toll Free: 1-877-226-1859

Email: apsdfd2019@apshousing.com

Hours: Monday-Friday: 8:30am to 5:00pm PT

In order to keep conference registration affordable it is **crucial** participants book through our housing website.

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The articles in this issue represent the views of the *Division of Fluid Dynamics (DFD) News* editorial team and are not necessarily those of individual DFD members or the APS.



Seattle skyline

- You can book, modify or cancel your hotel reservation anytime using the APS/DFD housing website.
- A valid credit card is needed to guarantee your reservation (no deposit will be charged at time of booking).
- Deadline for Reservations: the discounted hotel rates are available until **October 21st or until the room blocks at the conference hotels are sold out.**
- Cancellation: reservations need to be cancelled 72 hours prior to arrival to avoid a cancellation fee equal to one night room and tax (15.6% + \$2).
- All hotels are in walking distance to the Washington State Convention Center in the heart of downtown Seattle.

Hotel Rates

Hotel	Single or Double (1- 2 people)	Triple (3 people)	Quad (4 people)
Sheraton Grand Hotel Seattle (Headquarters Hotel) <i>Connected to Convention Center</i>	\$189	\$209	\$229
<small>Rates are per night and do NOT include 15.5% + \$2 lodging tax & fee per night; all rates include complimentary internet in sleeping rooms and are non-smoking.</small>			

REGISTRATION

Please visit the meeting website to register for the 2019 APS-DFD Meeting: apsdfd2019.org/registration

Student Registrants

APS student members may register for the meeting on-line at a discounted member rate by clicking "Member Registration". If you are not an APS member, you can JOIN NOW and then register online to receive discounted student rates. If you do not wish to become an APS member, you must pay the non-member rate.

First year membership is free for first time students and includes (2) free Divisions or Topical Groups for all students.

Undergraduate registrations do not include a ticket to the Sunday night reception. Reception tickets may be purchased for \$115.

International Registrants

All international attendees will automatically receive a letter of invitation at the time of registration. If you need one PRIOR to registering please go to the meeting website apsdfd2019.org/letter-of-invitation and follow the instructions. Please note it takes 3-5 days to process.

If you are not able to register on-line, [Click Here](#) to print off and fax your registration to: 801-355-0250.

REGISTRATION TYPE	REGULAR (9/22-10/24)	ON-SITE (10/25 – 11/26)
Member	\$570	\$750
Reciprocal Society Member	\$570	\$750
Retired Member (with APS Senior Membership)	\$310	\$400
Graduate Student Member**	\$295	\$400
Undergraduate Student Member**	\$120	\$175
Non Member	\$825	\$900
Additional Reception Ticket	\$115	\$115

Key Dates

Registration Deadlines

Regular Registration Rate

Sept 22 – Oct 24, 2019

On-Site Registration Rate

Oct 25 – Nov 26, 2019

Cancellation Deadline

(no registration refunds past this date)

Nov 8, 2019

Hotels Reduced Rate Ends

Oct 21, 2019 or earlier if block sells out

Gallery of Fluid Motion (GFM)

GFM Videos

Upload deadline is passed

GFM Poster

Upload and bring to meeting

Scientific Program

In the decades 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 3,400 abstracts in 42 parallel sessions including 83 technical posters and 92 student posters. Of the submitted abstracts 220 will be presented in a new format that we are pioneering at

this year's conference: the Flash Presentation (1-minute, 1-slide oral presentations to a large audience with a poster for further discussion immediately afterwards). Additionally, we will host the traditional Gallery of Fluid Motion Posters and Videos with 92 Video entries and 51 Poster entries.

This year's François Frenkiel, Andreas Acrivos, Stanley Corrsin awards and Fluid Dynamics Prize talks, along with 12 invited talks, 5 minisymposia, and 18 focus sessions on selected topics in fluid dynamics beautifully complement the numerous contributed presentations.

Awards Program

Each year the APS Division of Fluid Dynamics presents the Fluid Dynamics Prize, the Francois N. Frenkiel Award, the Andreas Acrivos Dissertation Award, and the Stanley Corrsin Award. The 2019 award winners, each of whom will give a lecture at the meeting, have been announced:

2019 Fluid Dynamics Prize Recipient:

Alexander Smits, Princeton University
Experiments in High Reynolds Number Flows

The citation reads, "For transformative contributions to the measuring and understanding of wall turbulence in extreme Reynolds and Mach number regimes, for pioneering research on bio-inspired propulsion, and in recognition of exemplary technical leadership, mentoring, and community service."

2019 Stanley Corrsin Award Recipient:

Jeffrey Morris, Levich Institute, City College of New York
From Microstructure to Models — Fluid Mechanics of Suspensions

The citation reads: "For outstanding contributions that elucidate the microscopic basis of the flow properties of suspensions, and their influence on macroscopic flow phenomena."

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

2019 Andreas Acrivos Dissertation Award Recipient:

Peter Balogh, Duke University
The Development and Application of a Computational Method for Modeling Cellular-Scale Blood Flow in Complex Geometry

2019 François N. Frenkiel Award Recipients:

Thomasina Ball, University of British Columbia, and Jerome Neufeld, University of Cambridge

Award for the paper titled: Static and dynamic fluid-driven fracturing of adhered elastica

Lecturer: Thomasina Ball. *Static and Dynamic Fluid-driven Fracturing of Adhered Elastica*

Invited Lectures

This year there will be **twelve** invited lectures on topics of broad interest to the DFD community which will be given by experts in each field.

Sunday, November 24

P.K. Yeung
Georgia Institute of Technology
Advancing Understanding of Turbulence Through Extreme-Scale Computation

Eleni Katifori
University of Pennsylvania
Living Flow Networks

Mickaël Bourgoïn
CNRS / ENS de Lyon
Lagrangian Turbulent Thermal Convection

Joanna Austin
California Institute of Technology
Dissecting Shock-Boundary Layer Interaction in Hypervelocity Flow

Shawn Shadden
University of California, Berkeley
Reduced Order Modeling of Blood Flow

C.P. Caulfield
University of Cambridge
Open Questions in Turbulent Stratified Mixing: Do We Even Know What We Do Not Know?

Monday, 25 November

Ruben Juanes
Massachusetts Institute of Technology
Impact of Wettability on Multiphase Flow and Granular Mechanics: Experiments, Modeling and Theory

Anya Jones
University of Maryland, College Park
Unsteady Aerodynamic Response of Rigid Wings in Gust Encounters

Chris Bretherton
University of Washington
Meteorological Fluid Dynamics and Climate Change

Shankar Subramaniam
Iowa State University
Multiphase Flows: Rich Physics, Challenging Theory, and Big Simulations

Pascale Garaud
University of California, Santa Cruz
Journey to the Center of the Stars: The Realm of low Prandtl Number Fluid Dynamic

Nicole Sharp
Sharp Science Communications Consulting, LLC
Adopting a Communication Lifestyle

Minisymposia

The 72nd Annual Meeting will feature 5 minisymposia. Presentations are 26 minutes.

- State of the Art in Naval Hydrodynamics
- Fluid Dynamics in the Clinical Management of Intracranial Aneurysms
- Machine Learning in Fluid Mechanics
- Bubbles, Drops and Particles in Non-Newtonian Fluids
- Fluid Mechanics and Art

Focus Sessions

This year's program includes 18 Focus Sessions, covering 10 topics. Each presentation is 13 minutes in duration.

1. **Advances in Magnetic Resonance Velocimetry**
 - Advances in Magnetic Resonance Velocity and the 2019 MRV Challenge I
 - Advances in Magnetic Resonance Velocimetry II
2. **Competing Roles of Surfactants in Free Surface Flows with Hydrodynamic Singularities**
3. **Direct Numerical Simulations of Fluid Interfaces, Deformation and Break-Up in Turbulence**
4. **Exascale Computations of Complex Turbulent Flows**
 - Exascale Computations of Complex Turbulent Flows I
 - Exascale Computations of Complex Turbulent Flows II
 - Exascale Computations of Complex Turbulent Flows III
5. **Fish Swimming Kinematics and Hydrodynamics**
 - Fish Swimming Kinematics and Hydrodynamics I
 - Fish Swimming Kinematics and Hydrodynamics II
6. **Immersive Education Platforms for Fluid Dynamics/ Education and Outreach**
7. **Leidenfrost Drops and the Physics of the Vapor Layer**
8. **Probing Multi-scale Flows by Coarse-graining**

9. Recent Advances in Data-driven and Machine Learning Methods for Turbulent Flows

- Recent Advances in Data-driven and Machine Learning Methods for Turbulent Flows I
- Recent Advances in Data-driven and Machine Learning Methods for Turbulent Flows II
- Recent Advances in Data-driven and Machine Learning Methods for Turbulent Flows III
- Recent Advances in Data-driven and Machine Learning Methods for Turbulent Flows IV
- Recent Advances in Data-driven and Machine Learning Methods for Turbulent Flows V

10. Smoothed Particle Hydrodynamics for Simulating Fluid Flow

Posters and Videos

All Poster Sessions will take place on Monday afternoon in the Exhibit Hall during the afternoon refreshment break (4:16-5:16 pm) and will include 83 Technical Posters, 92 posters in the Student Poster Competition, 220 Flash Presentation Posters, and 51 Gallery of Fluid Motion (GFM) Posters.

Those posters designated as Student Posters will be judged and awarded 1st and 2nd Prize for "Best Poster" in the following categories: Category 1: Computational/Theoretical, Category 2: Experimental. First and second place winners in each category will receive cash awards and certificates. Awardees will also be highlighted in the DFD Newsletter. The Student Poster Competition constitutes a specific opportunity for graduate and undergraduate students to enhance their presentation skills and to build their professional network.

Similarly, there will be 6 prizes awarded for both GFM Posters and videos based on artistic value, scientific content, and originality. Prize-winning posters will be displayed at the Annual APS meeting in March, 2020 and will appear in the September 2020 issue of the *Physical Review Fluids*. Please note that the videos will be accessible on-line at gfm.aps.org.

Authors from the Flash Oral Presentations Session will be standing by their posters during this poster session to further elaborate and share their research findings.

Audiovisual Equipment

All rooms will be equipped with an LCD projector, screen, microphone, and pointer. Speakers must provide their own laptop computer to use with the projector. A Speaker Ready Room (4C-2) with technicians will be available to help attendees ensure that their presentations work smoothly with the LCD projection equipment. We suggest all presenters visit the Speaker Ready Room in advance of their presentation.

Meeting room projectors will have 1920 by 1200 resolution. Please set your laptop resolutions to 1920 by 1200 (16×10 format). Your images will not display properly if your laptop resolution is higher than the projector's. The projectors are capable of supporting presentations at a lower resolution including presentations in a 4×3 format.

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.

Exhibitor and Sponsorship Opportunities

Exhibits will be centrally located in Exhibit Hall 4AB of the Washington State Convention Center.

For more information on exhibits or sponsorship, please email Margaret McDonald at:
margaret2@meetingsandmore.net

Conference Reception

Museum of Flight

Sunday, November 24

This year's reception will be at the Museum of Flight, the largest independent, non-profit air and space museum in the world! With over 176 aircraft and spacecraft, tens of thousands of artifacts, millions of rare photographs, dozens of exhibits, and a world-class library, the Museum and its people bring mankind's incredible history of flight to life.

All exhibit areas will be open for this event and the Museum allows food and drink throughout. Please plan to drop your backpack at your hotel prior to boarding the bus to the reception. Shuttle buses will be available from select hotels; more information to follow.

The reception is included in the registration fee for those who register as APS Members, Nonmembers, Graduate Students, and Retired Members. Undergraduate Members and others may purchase additional tickets when registering for the event.

APS/DFD Sponsored and Other Events

Please visit the meeting website at apsdfd2019.org/events for more information. Note both APS/DFD sponsored and other events are noted below and all are listed on the website. Many of the events listed are full at this time; however those who are not able to secure tickets can go to the event and check availability due to cancellations or no-shows.

Saturday, November 23

- Advice on Applying to Faculty and Postdoctoral Positions
- Tutorial for Authors and Referees

- Meet the *Physical Review Journal* Editors Reception
- Prepare to Teach

Sunday, November 24

- Young Investigator Workshop
- Fluids Education Lunch
- All the Faces of Fluid Dynamics

Monday, November 25

- Underrepresented Minorities in Research Breakfast
- Women in Fluids Networking Lunch
- Student Lunch
- Geophysical Fluid Dynamics Reception

Meeting Co-Chairs

2019: Seattle, WA

Alberto Aliseda

University of Washington
aaliseda@u.washington.edu

Dana Dabiri

University of Washington
dabiri@aa.washington.edu

Abstract Submissions

Eric Barth

Scientific Program Coordinator
American Physical Society
(301) 209-3285
Barth@aps.org

Registration

Phone: 1(800)217-0002
help@orchid.events

Exhibitor Information and Website Updates

Margaret McDonald

Meetings and More
Phone: (240) 355-5608
Margaret2@meetingsandmore.net

Hotel Reservations

Phone: 1(877)226-1859
Apsdfd2019@apshousing.com

General Meeting Questions

Monica Malouf

Meetings and More
Phone: (301) 526-8129
Monica@meetingsandmore.net

Peggy Holland

Meetings and More
Phone: (301) 641-4150
Peggy@meetingsandmore.net

Future APS/DFD Meetings**2020: Chicago, IL**

Jonathan Freund, Meeting Chair
University of Illinois Urbana-Champaign

2021: Phoenix, AZ

Marcus Hermann, Meeting Chair
Arizona State University

2022: Indianapolis, IN

Luciano Castillo, Meeting Chair
Purdue University

2023: Washington, DC

Ken Kiger, Meeting Co-Chair
University of Maryland

and

Michael Plesniak, Meeting Co-Chair
George Washington University

Newly Elected Executive Committee Members

The following are the newly elected members of the DFD Executive Committee. Their terms will begin immediately after the close of the 2019 APS DFD meeting

**Vice Chair**

John O. Dabiri
Stanford University

**Member-at-Large**

Satish Kumar
University of Minnesota

**Member-at-Large**

Alison Marsden
Stanford University

Obituaries

Bruno Eckhardt

On August 7, 2019, Prof. Bruno Eckhardt, Philipps University Marburg (Germany), passed away unexpectedly at the age of 59 from complications after a medical surgery. With his death, the international physics and fluid dynamics community loses far too early an outstanding theorist, committed teacher and a role model who never shied away from assuming responsibility in scientific self-administration.



Bruno studied physics at the Technical University of Kaiserslautern and at the Georgia Institute of Technology in Atlanta. In 1986 he defended his doctorate in Bremen on chaotic and quantum chaotic systems. After a stay at Forschungszentrum Jülich, Bruno became assistant professor in Marburg and worked on quantum chaos and periodic orbit quantization. After a short time at the University in Oldenburg, in 1996 he returned to Philipps University Marburg as full professor.

Here Bruno turned his interest to hydrodynamics and in particular to the transition to turbulence. In pipe flow, Couette flow and other shear flows, turbulence does not occur through linear instability and bifurcations, but suddenly, which corresponds to a chaotic saddle in the state space, as Bruno and his colleagues recognized thanks to numerical simulations and theoretical modelling. Bruno also discovered the so-called edge states in the pipe flow, which are a crucial element in the transition to turbulence. He also elucidated the role of coherent structures in turbulence transition in further shear flows and established the connection to chaos theory. His contributions are a lasting milestone in turbulence research.

Another of Bruno's passions was scientific publishing and the self-organization of the scientific community. He was Associate Editor of *Physical Review E* since 2007. He also played a leading role in the governing bodies of IUTAM and EUROMECH.

Bruno received many national and international honours and awards. In 2002 he was awarded the Leibniz Prize of the German Science Foundation and was also a Fellow of the APS, the IOP and EUROMECH.

We are losing a special student, friend, colleague, teacher and mentor. We will miss his sharp spirit, his constructive criticism and his tireless commitment to the welfare of the community.

Detlef Lohse

Chuan F. ("Tony") Chen

Prof. Chen, Professor Emeritus of Aerospace and Mechanical Engineering at the University of Arizona, died peacefully in his sleep on August 17, 2019, in Tucson, at the age of 86. Tony was born in Tianjin, China, and in 1950 came to the main campus of the University of Illinois, where his father had received an MS in Railway Engineering in 1929. After receiving his BSME and MSME degrees in 1953 and 1954, Tony continued his graduate studies in aeronautical engineering at Brown University, receiving his PhD in 1960.



Tony worked at Hydronautics, Inc. with Marshall Tulin in Laurel, Md. before embarking on a 50-year academic career. He spent 17 years at Rutgers University, serving as Chairman of the Department of Mechanical and Aerospace Engineering from 1976-1980. In 1980, Tony came to the Department of Aerospace and Mechanical Engineering at the University of Arizona as Head and quickly moved to build an outstanding fluid mechanics group. He was a wise, highly effective, and unselfish administrator, and an outstanding mentor of graduate students and junior faculty. He served as head for nine years and became Professor Emeritus in 2002.

Tony made important and lasting contributions in a number of areas, ranging from aerodynamics to the stability of Taylor-Couette and time-dependent flows, to doubly-diffusive flows, the latter including solidification and geological fluid mechanics. He employed a mix of experimental and theoretical techniques, and many of his PhD students were trained in both. Nothing delighted Tony more than finding something new, and understanding it. His work was recognized by election to Fellow status by APS, ASME, and AAAS. Tony held visiting appointments at the University of Cambridge, NASA-Ames Research Center, the Australian National University, and in Karlsruhe. He also served as Director of the Fluid Dynamics and Hydraulics Program at NSF. He will be missed.

Arne J. Pearlstein

APS/DFD Leadership & Contact Information

DFD members are invited to contact the DFD Leadership with suggestions and concerns.

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David Hu
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Ivan Marusic
(12/20)

Pirouz Kavehpour
(12/20)

Maysam Mousaviraad
(12/20)

Vivek Narsimhan
(12/21)
(ex-officio DFD web maint. & FB, Twitter interfacing)

Ken Kiger
(ex-officio Gallery of Fluid Motion maint.)

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Devesh Ranjan
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Adrian Sescu
(12/20)

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Thomas Ward
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Roberto Zenit
(12/20)

Petia Vlahovska
(12/20)

Luciano Castillo
(12/21)

P.K. Yeung
(12/21)