



Conference: Interfaces and Mixing in Fluids, Plasmas, Materials
Coordinators: Snezhana I. Abarzhi, William A. Goddard III, Katepalli R. Sreenivasan

23 October 2023

Session Topic (Interfaces and Mixing – Theory)
Morning Session Chair: Ethan Vishniac (John Hopkins University)

Talks are 2/3 speech + 1/3 discussion

8:50am	Lars Bildsten (KITP Director)	Welcome
9.00-9.15	Coordinators ()	Introduction
9.15-9.40	David Campbell (Boston University)	The metastable state of the Fermi-Pasta-Ulam-Tsingou problem
9.40-10.05	Xi Chen (Beihang University)	Unbounded wall turbulence induced by inverse cascade
10.05-10.30	Alex Klimenko (University of Queensland)	Would mixing be any different in a remote part of the universe?

10:30am MORNING BREAK

Session Topic (Fluids – Turbulence and Turbulent Mixing)
Morning Session Chair: Chihiro Matsuoka (Osaka Municipal University)

Talks are 2/3 speech + 1/3 discussion

11.00-11.30	James Glimm (State University of New York Stony Brook)	Smooth solutions of the Navier-Stokes Equation
11.30-12.00	Kartik Iyer (Michigan Tech University)	Scaling characteristics of hydrodynamic turbulence
12.00-12.30	Alexander Migdal (New York University)	Exact solution of decaying turbulence

12:30pm LUNCH BREAK



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Session Topic (Fluids – Turbulence, Turbulent Mixing, and Interfacial Mixing)
Afternoon Session Chair: Snezhana Abarzhi (University of Western Australia)

Talks are 2/3 speech + 1/3 discussion

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| 2.00-2.30 | Katepalli Sreenivasan
(New York University) | Turbulent convection at very high Rayleigh numbers and the weakly nonlinear theory by Herring, Busse and others |
| 2.30-3.00 | Peter Vorobieff
(University of New Mexico) | Interfacial instability as a single- and multiphase phenomenon |
| 3.00-3.30 | William Irvine
(University of Chicago) | Weaving tangled vortex webs: vortex knots, conservation of helicity and turbulent blobs |

3:30pm AFTERNOON BREAK

Session Topic (Plasmas – Canonical, Astrophysical, High Energy Density)
Afternoon Session Chair: Paul Bellan (California Institute of Technology)

Talks are 2/3 speech + 1/3 discussion

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| 3.50-4.15 | Ken Hara
(Stanford University) | Instabilities and non-classical transport in partially-ionized, partially-magnetized plasmas |
| 4.15-4.40 | Bryce Barclay
(Arizona State University) | Vectorial EM signal reconstruction in stochastic, inhomogeneous media and optimal observation times |
| 4.40-5.05 | Amita Das
(Indian Institute of Technology Delhi) | Magnetic turbulence in high intensity laser produced plasmas |
| 5.05-5.30 | Drummond Fielding
(Flatiron Institute) | How rapid radiative cooling controls astrophysical turbulent mixing layers |

5:30pm SHUTTLE TO BWSCI



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24 October 2023

Session Topic (Materials – Interfacial Processes and Reactive Dynamics)
Morning Session Chair: William Goddard (California Institute of Technology)

Talks are 2/3 speech + 1/3 discussion

- 9.00-9.25 Anastasia Alexandrov Interfacial fluxionality in electrocatalysis: the ever-changing nature of the active site
(University of California Los Angeles)
- 9.25-9.50 Alessandro Fortunelli ML-accelerated DFT sampling of catalytic processes at heterogeneous interfaces
(CNR)
- 9.50-10.15 Adri van Duin Atomistic-scale simulations of realistic, complex, reactive materials: the ReaxFF method, its applications and recent developments for plasma simulations
(Pennsylvania State University)
- 10.15-10.40 Akihiro Morita Microscopic mechanisms of ion transport and reactions at liquid-liquid interface
(Tohoku University)

10:40am MORNING BREAK

Session Topic (Materials and Plasmas – Matter at the Extremes)
Morning Session Chair: Richard Sydora (University of Alberta)

Talks are 2/3 speech + 1/3 discussion

- 11.00-11.30 Frank Graziani Shock physics in warm dense matter: A quantum hydrodynamics perspective
(Lawrence Livermore National Laboratory)
- 11.30-12.00 Vasily Zhakhovsky Shock-induced melting and crystallization in titanium irradiated by ultrashort laser pulse
(Joint Institute for High Temperatures, Academy of Sciences)
- 12.00-12.30 Hiroshi Azechi Integral model of Rayleigh-Taylor and Richtmyer-Meshkov instabilities in inertial fusion plasmas
(Osaka University)

12:30pm LUNCH BREAK



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24 October 2023

Session Topic (Interface Dynamics and Kinetics – Theory and Simulations)
Afternoon Session Chair: Hiroshi Azechi (Osaka University)

Talks are 2/3 speech + 1/3 discussion

- 2.00-2.45 William Goddard Reactive dynamics simulations at interfaces between solid and liquid materials: successes and difficulties (California Institute of Technology)
- 2.45-3.30 Snezhana Abarzhi Interface dynamics in ideal and realistic fluids (University of Western Australia)

3:30pm AFTERNOON BREAK

Session Topic (Plasmas – Astrophysics and Magneto-hydrodynamics)
Afternoon Session Chair: Peng Oh (University of California Santa Barbara)

Talks are 2/3 speech + 1/3 discussion

- 3.50-4.15 Robert Fisher Turbulent detonation in type Ia supernovae (University of Massachusetts Dartmouth)
- 4.15-4.40 David Hosking Metastability of MHD atmospheres and their relaxation (Princeton University)
- 4.40-5.05 Michael Zingale Convective mixing in stellar reactive flows (State University of New York Stony Brook)
- 5.05-5.30 Ethan Vishniac Magnetic field transport in thin accretion disks (John Hopkins University)

5:30pm SHUTTLE TO BWSCI



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25 October 2023

Session Topic (Fluids – Turbulence and Turbulent Mixing)
Morning Session Chair: Kartik Iyer (Michigan Tech University)

Talks are 2/3 speech + 1/3 discussion

- 9.00-9.25 Toshiyuki Gotoh Spectrum of passive scalar variance with inherent time scale in turbulence
(Nagoya Institute of Technology)
- 9.25-9.50 Lipo Wang Structure of turbulence based on multi-level extremal points
(University of Michigan-Shanghai Jiao Tong University Joint Institute)
- 9.50-10.15 Yuli Chashechkin Inseparable actively interacting waves, vortices and ligaments in a new mechanism for densities of miscible liquids, gases or plasma equalizing
(Ishlinsky Institute for Problems in Mechanics, Academy of Sciences)
- 10.15-10.40 Sergey Chefranov A new precise analytical solution to the main turbulence problem
(Technion – Israel Institute of Technology)

10:40am MORNING BREAK

Session Topic (Fluids – Instabilities and Interfacial Mixing)
Morning Session Chair: James Glimm (Stony Brook University)

Talks are 2/3 speech + 1/3 discussion

- 11.00-11.30 Marcus Herrmann A dual-scale LES model for sub-filter dynamics of immiscible interfaces
(Arizona State University)
- 11.30-12.00 Chihiro Matsuoka Nonlinear interaction of vortex sheets in multi-interface Kelvin-Helmholtz, Rayleigh-Taylor, and Richtmyer-Meshkov instabilities
(Osaka Metropolitan University)
- 12.00-12.30 Snezhana Abarzhi Fluid instabilities and interfacial mixing
(University of Western Australia)

12:30pm LUNCH BREAK



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25 October 2023

Session Topic (Interfaces in Fluids, Plasmas, Materials – Experiment)
Afternoon Session Chair: William Irvine (University of Chicago)

Talks are 2/3 speech + 1/3 discussion

- 2.00-2.30 Mark Schlossman Ion-extractant complexation and transport near liquid-liquid interfaces in solvent extraction processes
(University of Illinois Chicago)
- 2.30-3.00 Dan Ilyin Interfaces and mixing in three-dimensional micro-printing technology
(Stanford University)
- 3.00-3.30 Richard Sydora Experiments and simulation of the turbulent mixing between multiple spinning magnetized plasma pressure filaments
(University Alberta)

3:30pm AFTERNOON BREAK

Session Topic (Interface Dynamics – Numerical Modeling)
Afternoon Session Chair: Marcus Herrmann (Arizona State University)

Talks are 2/3 speech + 1/3 discussion

- 3.50-4.15 Stanley Osher The level set method - past, present and future
(University of California Los Angeles)
- 4.15-4.40 Alexei Chekhlov Lattice Boltzmann model in general curvilinear coordinates applied to exactly solvable 2D flow problems
(Dassault Systems)
- 4.40-5.05 Thomas Hou Potentially singular behavior of 3D incompressible Navier-Stokes equations
(California Institute of Technology)
- 5.05-5.30 Tulin Kamal Recent advancements in front-tracking based Rayleigh-Taylor simulations
(University of Arkansas)

5:30pm SHUTTLE TO BWSCI



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26 October 2023

Session Topic (Fluids – Realistic Environments)
Morning Session Chair: Tulin Kaman (University of Arkansas)

Talks are 2/3 speech + 1/3 discussion

- 9.00-9.25 Guido Boffetta Dimensional transition in Rayleigh-Taylor mixing
(University of Turin)
- 9.25-9.50 Alik Nepomnyashchy Marangoni convection in solutions
(Technion - Israel Institute of Technology)
- 9.50-10.15 Daniela Tordella Super-saturation of turbulent fluctuations in atmospheric cloud-
environmental air unsteady interfaces
(Politecnico di Torino)
- 10.15-10.40 Juan Lopez Mixing and transport of dissolved CO₂ in water by a rotating knife edge
(Arizona State University)

10:40am MORNING BREAK

Session Topic (Fluids and Materials – Instabilities and Interfacial Processes)
Morning Session Chair: Akihiro Morita (Tohoku University)

Talks are 2/3 speech + 1/3 discussion

- 10.15-10.40 Aurora Clark Geometric and topological descriptors of the organization and dynamics
at soft-matter interfaces
(University of Utah)
- 11.00-11.25 Benjamin Doughty Liquid/liquid interfaces at and away from equilibrium
(Oak Ridge National Laboratory)
- 12.15-12.40 Yasuhide Fukumoto Effect of compressibility on Kelvin-Helmholtz and Rayleigh-Taylor
instabilities
(Kyushu University)

12:40pm LUNCH BREAK



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26 October 2023

Session Topic (Plasmas and Fluids – Astrophysics and Magneto-hydrodynamics)
Afternoon Session Chair: David Campbell (Boston University)

Talks are 2/3 speech + 1/3 discussion

- 2.00-2.30 Peng Oh Turbulent mixing layers in multi-phase gas
(University of California Santa Barbara)
- 2.30-3.00 Simon Bolanos Laboratory study of the initial stages of quasi-parallel collisionless shocks
at high Alfvén Mach number using high-power lasers
(University of California San Diego)
- 3.00-3.30 Paul Bellan Experimental observation of cascade of qualitatively different plasma instabilities
(California Institute of Technology)

3:30pm AFTERNOON BREAK

Session Topic (Fluids – Numerical Modeling of Realistic Environments)
Afternoon Session Chair: Mark Schlossman (University of Illinois Chicago)

Talks are 2/3 speech + 1/3 discussion

- 4.00-4.25 Josette Bellan Characteristics of multi-species mixing in high-pressure turbulent flow
from direct numerical simulations
(California Institute of Technology)
- 4.25-4.50 Timothy Wallstrom Estimating reaction rates from models of variable-density turbulent flow
(Los Alamos National Laboratory)
- 4.50-5.15 Alan Kerstein Investigations of turbulence-modulated interfaces using a stochastic
model
(Stochastic Sciences Inc)
- 5.15-5.30 Coordinators Summary
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5:30pm **CONFERENCE END SHUTTLE TO BWSCI *Also available to SB Airport and SB Airbus,
Goleta location. (See Registration Desk BEFORE THURSDAY to sign up.)**