

ILASS Americas 30th Annual Conference 2019

Sunday, May 12

S 5:00-7:00 PM **Registration** ISTB4 Ground Floor

S 5:30-7:30 PM **Welcome Reception with Exhibitors** ISTB4 3rd Floor

Monday, May 13

M 7:00-7:45 AM **Breakfast with Exhibitors** ISTB4 3rd Floor

M 7:45-8 AM **Welcome and Opening Remarks** SCOB 210

M 8-8:50 AM **Keynote Lecture** SCOB 210
Driving Innovation in Fire Sprinkler Sprays
 Andre W. Marshall, University of Maryland & NSF Program Director

M 8:50-9:45 AM **Plenary Session with Exhibitors** SCOB 210
 Chair: Mike Cloeter

3D Imaging of Atomization (Special Session)

Chairs: B. Halls & K. Bade
 SCOB 210

Automotive Sprays I

Chairs: S. Parrish & L. Pickett
 SCOB 228

M 10:00 AM **33: High-speed four-dimensional liquid mass distribution measurements in impinging jet sprays**
 N. Rahman, B. Halls, T. Meyer, J. Gord, M. Slipchenko, M. Lightfoot
 Purdue University, Aerospace Systems Directorate WPAFB, Aerospace Systems Directorate Edwards AFB

106: Characterization of a Gasoline Multi-hole Spray Under Closely-Spaced Multiple Injection Operating Conditions
 R. Grover, S. Parrish
 General Motors

M 10:20 AM **41: Blood atomization from blunt impact on a liquid film using high-speed digital in-line holography**
 R. Das, R. Faflak, D. Attinger, J. Michael
 Iowa State University

71: A Stochastic Kelvin-Helmholtz/Rayleigh-Taylor Breakup Model and a Synthetic Eddy Injection Model for Large-Eddy Simulations of Diesel Sprays
 C-W. Tsang, C. Rutland
 The Dow Chemical Company, University of Wisconsin-Madison

M 10:40 AM **56: Development of an atomization system for testing spraying variables using optical instruments**
 J. Giraldo, A. Colorado, A. Amell
 GASURE, University of Antioquia

40: An Experimental and Computational Study of Fuel Properties Effect on Inert Spray Characteristics under Compression Ignition Engine Conditions
 L. Zhao, M. Ameen, Y. Pei, M. Tang, Y. Zhang, M. Traver
 Argonne National Laboratory, Aramco Research Center

M 11:00-11:30 AM **Break** ISTB4 3rd floor

Spray Characterization & Measurement IChairs: A. Thistle & M. Cloeter
SCOB 210**Compressible Multiphase Atomization
(Special Session)**Chairs: O. Desjardins & M. Herrmann
SCOB 228

M 11:30 AM	25: Measurement of Liquid Core Length of a Coaxial Two-fluid Spray D. Li, J. Bothell, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren Iowa State University, University of Washington, Argonne National Laboratory	85: Diffuse Interface Modeling of Compressible Multiphase Flows using an Adaptive Mesh Refinement Library F. Fritz, K. Kannan, C. Ballesteros, N. Fleischmann, M. Herrmann Technical University Munich, Arizona State University
M 11:50 AM	51: Model reduction of primary atomization using optical flow P. Sashittal, D. Bodony University of Illinois at Urbana-Champaign	59: A Robust All-Mach Multiphase Flow Algorithm for High-Fidelity Simulations of Compressible Atomization M. Kuhn, O. Desjardins Cornell University
M 12:10 PM	90: Complementary Characterization of Standard Simplex Atomizers using Phase Doppler Interferometry and X-ray Radiography B. Sforzo, S. Leask, A. Li, A. Tekawade, C. Powell, V. McDonnell, A. Kastengren Argonne National Laboratory, University of California Irvine	46: An all-Mach multiphase flow solver using block-structured AMR M. Natarajan, R. Chiodi, M. Kuhn and O. Desjardins Cornell University

M 12:30-1:30 PM

LunchISTB4 3rd Floor

M 1:30-2:20 PM

Technical Committee Meetings

Physics of Atomization

ISTB4 3rd Floor

Computation and Modeling

ISTB4 240

Diesel & Automotive

ISTB4 Marston Theater

Sessions**Computational Methods for Atomization I**Chairs: M. Trujillo & B. Turnquist
ISTB4 Marston Theater**Sprays in Analytical Plasma Spectroscopy (Special Session)**Chairs: A. Montaser & V. McDonnell
ISTB4 240

M 2:30 PM	35: Adjoint-based interfacial control of axisymmetric viscous drops A. Fikl, D. Bodony University of Illinois at Urbana-Champaign	104: The Importance of Atomic Spectrometry in Life and the Significance of Spray Quality A. Montaser The George Washington University
M 2:50 PM	24: Euler-Lagrange Simulations With Fully-Resolved Physics of Dense Spray Control K. Liu, S. Balachandar University of Florida	103: A Piezoelectrically Driven Nebulizer for Inductively Coupled Plasma (ICP) Atomic Spectrometry H. Badiei PerkinElmer Inc.
M 3:10 PM	26: Effect of Interface Reconstruction Methods on Atomizing Liquid Jet Simulations R. Chiodi, O. Desjardins Cornell University	105: Element- and size- based characterization of nanomaterials by interfacing ICP-MS with Field-Flow Fractionation S. Tadjiki, A. Montaser Postnova Analytics Inc., The George Washington University
M 3:30 PM	36: An efficient pressure solver for stochastic gas-liquid multiphase flows B. Turnquist, M. Owkes Montana State University	101: Development of Droplet Injection ICP-AES/MS and Elemental Analysis of Single Human Cancer Cells A. Okino, S. Kohno, T. Miyake, Y. Suenaga, M. Shimada, Y. Matsumoto, K. Chiba Tokyo Institute of Technology, Kwansai Gakuin University

Sessions	Atomization Theory, Analysis, & Modeling Chairs: J. Poblador-Ibanez & D. Bodony ISTB4 Marston Theater	Internal and Near Nozzle Behavior Chairs: D. Sedarski & Y. Ling ISTB4 240
M 4:20 PM	58: Role of Density in Gas-Assist Counterflow Atomization E. Johnson, V. Srinivasan, P. Strykowski, A. Hoxie University of Minnesota Duluth, University of Minnesota Twin Cities	57: A Computational Study of Nozzle Internal Flow and Its Effect on Spray Atomization A. Agarwal, M. Trujillo University of Wisconsin - Madison
M 4:40 PM	99: Control-Informed Dynamic Mode Decomposition Applied to the Ginzburg-Landau Equation M. Banks, D. Bodony University of Illinois at Urbana-Champaign	52: Temperature Dependent In-Nozzle Flow Investigations of Marine Diesel Injectors R. Balz, D. Sedarsky Chalmers University of Technology
M 5:00 PM	93: Extraction of Droplet Genealogies from High-Fidelity Atomization Simulations C. Rubel, M. Owkes Montana State university	47: Numerical investigation of air bubbles formation and dynamics in flow-blurring atomizers and its impact on near nozzle liquid breakup D. Jiang, L. Jiang, Y. Ling Baylor University, University of Louisiana at Lafayette
M 5:20 PM	18: Improving the validation of turbulent jet breakup models B. Trettel University of Texas at Austin	49: Influence of K-factor on Cavitation Suppression for a Heavy-duty Diesel Injector Operating with Straight-run Gasoline R. Torelli, G. Magnotti, S. Som, Y. Pei, M. Traver Argonne National Laboratory, Aramco Services Company: Aramco Research Center – Detroit

Tuesday, May 14

T 7-7:50 AM

Breakfast with Exhibitors

ISTB4 3rd Floor

T 7:50-8:00 AM

Opening Remarks

SCOB 210

T 8:00-8:50 AM

Keynote Lecture
Physical Mechanisms of Droplet/Turbulence Interaction
Antonino Ferrante, University of Washington

SCOB 210

X-Ray Diagnostics of Sprays I (Special Session)

Chairs: A. Kastengren & K.-C. Lin
SCOB 210

Jet-in-Crossflow I (Special Session)

Chairs: B. Bornhoft & A. Hoxie
SCOB 228

T 9:00 AM

07: Neutron Imaging for the Two-Phase Flows inside an Aluminum Aerated-Liquid Injector

K.-C. Lin, C. Carter, L. Santodonato, H. Bilheus, Z. Zhang, C. Smith, A. Kastengren
Taitech Inc., Air Force Res. Lab., Oak Ridge Nat. Lab., U. Tennessee, Argonne Nat. Lab

60: Analysis of a Liquid Jet in Supersonic Crossflow using Large-Eddy Simulation

M. Kuhn, O. Desjardins
Cornell University

T 9:20 AM

31: Optimization of High-Speed White Beam X-ray Imaging for Spray Characterization

T. Morgan, J. Bothell, T. Burnett, D. Li, T. Heindel, A. Aliseda, N. Machicoane, K. Matusik, A. Kastengren
Iowa State U., U. Washington, Argonne Nat. Lab

28: Validation and Analysis of primary atomization of turbulent liquid jet in crossflow simulations

A. Asuri Mukundan, T. Ménard, A. Berlemont, J. Brändle de Motta, M. Herrmann
CNRS UMR6614 CORIA, Arizona State University

T 9:40 AM

95: Preliminary Investigation of Apparent Mass Loss in Objects Due to Image Blur using X-ray Radiography

B. Halls
Sandia National Laboratories

87: An Analysis of Proper Orthogonal Decomposition and Dynamic Mode Decomposition on Liquid Jets in Crossflow

S. Leask, V. McDonell, S. Samuelsen
UCI Combustion Laboratory

T 10:00 AM

81: X-ray scattering-based temperature measurements of liquid in multiphase flows

N. Rahman, B. Halls, T. Meyer, J. Gord, K. Matusik, A. Kastengren
Purdue U., Aerospace Systems Directorate WPAFB, Argonne Nat. Lab., Innovative Scientific Solutions

03: A hybrid approach applied to spray in liquid jet in crossflow

D. Fontes, L. Meira, F. De Souza
Federal University of Uberlândia

T 10:20-10:50 AM

Break

ISTB4 3rd Floor

Droplet PhenomenaChairs: D. Johnson & K. Feigl
SCOB 210**Spray Wall Interaction****(Special Session)**Chairs: M. Trujillo & F. Wang
SCOB 228

T 10:50 AM **67: Oscillation dynamics of a sessile drop on hydrophobic and hybrid surfaces**
Y. Ling, J. Sakakeeny, X. Li, S. Popinet, J. Alvarado
Baylor University, Sorbonne Universite, CNRS, UMR 7190, Institut Jean Le Rond d'Alembert, Texas A&M University

39: Spray wall interaction and the formation of fuel wall films
F. Schulz, F. Beyrau
Otto-von-Guericke-Universität Magdeburg

T 11:10 AM **74: Computational and Experimental Investigation of Drop Breakup in Antral Contraction Wave Flows in a Model Stomach**
F. Tanner, K. Feigl, D. Dufour, E. Windhab
Michigan Technological University, ETH Zurich

82: Retraction of water droplets after impact on solid substrates with different wettabilities
F. Wang, T. Fang
North Carolina State University

T 11:30 AM **66: Filament Extension Atomization**
D. Johnson, J. Unidad, R. Neelakantan, M. Benedict, J. Kalb, K. Murphy, E. Karatay, E. Weflen
PARC, A Xerox Company

48: A computational study of splashing drop trains: secondary droplet formation and characterization
D. Markt Jr, A. Pathak, M. Raessi, S. Lee, R. Torelli
University of Massachusetts Dartmouth, Michigan Technological University, Argonne National Laboratory

T 11:50-1:10 PM

Lunch and ILASS Americas Annual Business Meeting ISTB4 3rd Floor

T 1:10-2:00 PM

Technical Committee Meetings

Industrial & Agricultural Sprays

ISTB4 3rd Floor

Aerospace Propulsion

ISTB4 Marston Theater

Spray Measurements

ISTB4 240

Turbulence Phenomena in Spray (Special Session)Chairs: O. Kaario & F. Tanner
ISTB4 240**Jet-in-Crossflow II (Special Session)**Chairs: K.-C. Lin & M. Kamin
ISTB4 Marston Theater

T 2:10 PM **19: Turbulent theory of velocity-profile-induced jet breakup**
B. Trettel
University of Texas at Austin

14: Secondary Droplet Breakup Effects in Aerated-Liquid Injection into Subsonic and Supersonic Crossflows
J. Talbot, A. Kulkarni, J. Edwards, K-C. Lin, B. Bornhoff
North Carolina State University, Air Force Research Laboratory

T 2:30 PM **37: A Sub-grid Scale Energy Dissipation Rate Model for Large-eddy Spray Simulations**
H. Li, C. Rutland, H. Im, F. Hernandez Perez
University of Wisconsin-Madison, King Abdullah University of Science and Technology

69: Effect of Density Ratio on Flowfield and Spray dynamics of Vaporizing Liquid Jet in Crossflow
M. Kamin, P. Khare
University of Cincinnati

T 2:50 PM **83: The Effect of Fuel: Large-Eddy Simulation of Spray A with Various Fuels**
O. Kaario, V. Vuorinen, H. Kahila, M. Larmi
Aalto University

09: Numerical Simulation of Aerated-Liquid Injection into a Supersonic Crossflow
B. Bornhoff, K-C. Lin
Air Force Research Laboratory, Taitech, Inc.

T 3:10 PM-3:40 PM

BreakISTB4 3rd Floor

Atomization & Spray Simulations IChairs: X. Li & D. Markt
ISTB4 Marston Theater**Spray Characterization & Measurements****II**Chairs: K. Bade & C. Lipp
ISTB4 240**T 3:40 PM 75: Drop evaporation and scalar mixing in dilute acetone sprays using large eddy simulation**X. Wang, J. Oefelein
Georgia Institute of Technology**T 4:00 PM 34: Numerical Investigation on a New Design Concept of the Auxiliary Inspiratory Flow Supply Device for Dry Powder Inhalers**Y. Wu, J. Deng
Trinity Valley School, School of Automotive Studies, Tongji University**T 4:20 PM 42: Best Practices in the numerical modelling of liquid atomization processes**M. Sami, J. Schuetze, P. Hutcheson, P. Aguado
Ansys**92: Spray Nozzle Implementation for a Gas-Liquid Feed Application**M. Cloeter, C. Davidson, L. Hable, N. Wallace
The Dow Chemical Company, Tenengeer, Inc., BETE Fog Nozzle, Inc.**38: Control of large-scale instabilities and of drop sizes in assisted atomization**M. Alonzo, Z. Huang, A. Cartellier
Univ. Grenoble Alpes, CNRS, Grenoble INP, Laboratory of Geophysical and Industrial Flows**88: Advances in imaging diagnostics for icing research in aircraft engines**J. Manin, W. Bachalo
Artium Technologies**T 5:00 PM****Transport to Museum**

Entrance to ISTB4

T 6:00-7:30 PM**Cocktail Reception, Museum Tours****T 7:30-9:30 PM****Dinner****T 9:30 PM****First Shuttle Departs****T 10:45 PM****Last Shuttle Departs**

Wednesday, May 15

W 7-7:50 AM

Breakfast with Exhibitors

ISTB4 3rd Floor

W 7:50-8 AM

Opening Remarks

ISTB4 Marston Theater

Sessions

Experimental Methods & Instrumentation

Chairs: M. Minniti & D. Talley
ISTB4 Marston Theater

Atomization & Spray Simulations II

Chairs: M. Sami & K. Olshefski
ISTB4 240

W 8:00 AM

01: Enhanced Methods to Analyze and Extract Additional Insights from Liquid Flux Distribution (Patternation) Spray Data
C. Lipp
Lake Innovation LLC

50: Adjoint-based optimal control of an air-blasted planar sheet
L. Vu, A. Fikl, D. Bodony, O. Desjardins
Cornell University, University of Illinois at Urbana-Champaign

W 8:20 AM

05: Overcoming Saturation: Eliminating Intensity-Related Size Dynamic Range Limitations to Phase-Doppler Interferometry
C. Sipperley, K. Bade, R. Schick
Step 2 Consulting, Inc., Spraying Systems, Co.

44: Impact of Operating Conditions on the Spray in a High-Shear Nozzle/Swirler Injector Investigated using High-Fidelity Simulations
X. Li
United Technologies Research Center

W 8:40 AM

72: Femtosecond Holography of a Dodecane Jet Spray at High-Pressure Conditions
M. Minniti, A. Ziaee, D. Curran, J. Porter, T. Parker, D. Dunn-Rankin
University of California Irvine, Metrolaser Inc., Colorado Schools of Mines, Florida Polytechnic University

64: Modeling and detailed numerical simulation of the primary breakup of the "Spray G" gasoline jet
B. Jiang, Y. Ling
Baylor University

W 9:00 AM

29: An extinction-based technique for high-pressure spray field quantification
F. Poursadegh, O. Bibik, B. Yraguen, C. Genzale
Georgia Institute of Technology

12: Analysis of an axisymmetric liquid jet at supercritical pressures
J. Poblador-Ibanez, W. Sirignano
University of California Irvine

W 9:20-10:00 AM

Break & Poster Session

ISTB4 3rd Floor

17: Sensitivity of the range of a water jet to the breakup length and air entrainment
B. Trettel, O. Ezekoye
University of Texas at Austin

53: Impingement Injector Spray Characteristics - A Study Using POD Technique
R. Pereira, D. Frederick
University of Alabama in Huntsville

84: Can a chart based on millions of trajectory simulations provide a simple tool to estimate how far a blood drop can fly?
D. Attinger
Iowa State University

94: Demonstration of a Spectral Microscopy Imaging System for High Resolution, High-Speed Imaging of Primary Breakup in Fuel Sprays
K. Maassen, F. Poursadegh, C. Genzale
Georgia Institute of Technology

96: Near-Field Spray Characteristics of Vegetable Oil Using Flow Blurring Injection
I. Qavi, N. Nasim, O. Akinyemi, L. Jiang
University of Louisiana at Lafayette

97: Study of Spray Characteristics for Different Impingement Lengths of Each Jet of Like Doublet Impinging Injectors.
S. Kathalagiri Vasantha kumar, F. Robert. A.
The University of Alabama in Huntsville

102: High-Fidelity Simulation of a Rotary Bell Atomizer with Electrohydrodynamic Effects
V. Krishna, M. Owkes
Montana State University

X-Ray Diagnostics of Sprays II (Special Session)

Chairs: T. Meyer & J. Bothell
ISTB4 Marston Theater

Computational Methods for Atomization II

Chairs: M. Owkes & O. Desjardins
ISTB4 240

- W 10:00 AM** **86: Characterization of Near-Field Structures of Diesel Containing Carbon Dioxide in a Quiescent Environment Using X-Ray Radiography**
T. Tidball, K.-C. Lin, A. Kastengren, T. Ombrello
Taitech, Argonne, Nat. Lab., Air Force Res. Lab.
- W 10:20 AM** **61: X-ray Characterization and Spray Measurements of ECN Spray G Using Alternative Fuels Under Flashing Conditions**
B. Sforzo, A. Tekawade, K. Matusik, A. Kastengren, J. Ilavsky, K. Fezzaa, C. Powell
Argonne National Laboratory
- W 10:40 AM** **08: Exploration of Near-Field Structures of Aerated-Liquid Jets in Quiescent and Crossflow Environments Using Confocal X-Ray Fluorescence**
K.-C. Lin, A. Kastengren, C. Carter
Taitech, Argonne National Laboratory
- W 11:00 AM** **10: Statistical analysis of focused beam measurements taken from a coaxial airblast spray**
J. Bothell, D. Li, T. Morgan, T. Heindel, A. Aliseda, N. Machicoane, A. Kastengren
Iowa State University, University of Washington, Advanced Photon Source
- W 11:20 AM** **65: A comparison between CFD and 3D X-ray Diagnostics of Internal Flow in a Cavitating Diesel Injector Nozzle**
A. Tekawade, P. Mitra, B. Sforzo, K. Matusik, A. Kastengren, D. Schmidt, C. Powell
Argonne National Laboratory, University of Massachusetts at Amherst
- 89: Modeling Drop Deformation Effects in the Euler-Lagrange Prediction of Liquid Jet in Cross Flow**
P. Pakseresht, S. Apte
Oregon State University
- 73: Advancements to a Dual-Scale approach for Simulating Turbulent Phase Interface Interactions**
D. Kedelty, M. Herrmann, T. Ziegenhein
Arizona State University
- 54: Speedup Analysis of Adaptive Mesh Refinement in the Simulation of Spray Formation**
C. Kuo, M. Trujillo
University of Wisconsin - Madison
- 15: Conservative Simulations of Atomization - Combining the Height Function Method with Rudman Dual Grids**
K. Olshefski, M. Owkes
Montana State University
- 30: Validation and Analysis of 3D DNS of planar pre-filming airblast atomization simulations**
A. Asuri Mukundan, T. Ménard, A. Berlemont, J. Brändle de Motta, R. Eggels
CNRS UMR6614 CORIA, Rolls-Royce Deutschland

W 11:40-12:30 PM

Lunch and Prize Drawings

Spray Applications II

Chairs: R. Grover & F. Schulz
ISTB4 Marston Theater

Automotive Sprays II

Chairs: C. Powell & F. Poursadegh
ISTB4 240

W 12:30 PM

45: Development of a screening tool to assess fuel property effects on cavitation and erosion propensity

G.M. Magnotti, S. Som
Argonne National Laboratory

63: 3D Imaging of Cavitating Flow in a Diesel Injector at Practical Conditions using micro-CT

A. Tekawade, B. Sforzo, K. Matusik, A. Kastengren, C. Powell
Argonne National Laboratory

W 12:50 PM

11: PRELIMINARY STUDY OF THE REACTING FLOW FROM MULTI-ELEMENT SHEAR COAXIAL FLOWS

M. Roa, D. Talley
Sierra Lobo, Inc., AFRL/RQRC

100: The influence of ambient conditions and fuel type on gasoline spray plume direction

J. Hwang, L. Weiss, L. Pickett, S. Skeen
Sandia National Laboratories, FAU
Erlangen-Nuremberg

W 1:10 PM

27: Characterization of Aqueous Cellulose Nanocrystals Sprays for Strengthening 3D Printed Polymer Structures

S. Shariatnia, F. Poursadegh, A. Asadi, D. Jarrahbashi
Texas A&M, Georgia Institute of Technology

20: An improved non-equilibrium multi-component evaporation model for blended diesel/alcohol droplets and sprays

P. Yi, S. Yang, T. Li, Y. Li
University of Minnesota-Twin Cities,
Shanghai Jiao Tong University, Lund
University

W 1:30 PM

80: Easy flowing emulsion (o/w) based spray-dried powder produced using dietary fiber as a wall material

B. Dubey, P. Roncato, M. Howarth
National Centre of Excellence for Food
Engineering, Sheffield Hallam University

79: Varying the Bell Speed of an Electrostatic Rotating Bell

K. Sidawi, P. Moroz, S. Chandra
University of Toronto, Polycon Industries

W 1:50 PM

Conference closes