



Basic Research Innovation Collaboration Center (BRICC)
4100 N Fairfax Drive, Suite 450
Arlington, VA 22203

Agenda Day 1 | Monday, December 11, 2023

ONR MURI Project Review


Particulate and Precipitation Effects on High-speed Flight Vehicles – Schwartzentruber (PI)

Time	Topic	Speaker
8:05	Check-in/Login	
8:30-8:40	“Meeting Introduction” (Agenda, Rules, Technical intro)	Eric Marineau
8:40-8:50	MURI Year-3 Overview	Tom Schwartzentruber
8:50-9:15	Experiments of High-Speed Particle Collisions with Surfaces	Chris Hogan
9:15-9:40	Modeling Particle Interactions with High-speed Flow	Tom Schwartzentruber
9:40-10:05	CFD Framework and Modeling for Particle/Droplet Flow Interactions	Graham Candler
10:05-10:20	BREAK	
10:20-10:45	Particle and Droplet Impact Modeling	Peter Yip
10:45-11:10	PISALE Code Development for Particle Impacts	Alice Koniges
11:10-11:35	Advanced Diagnostics and Imaging of Droplet Demise at High Weber Number	Nick Parziale
11:35-12:00	Wind-tunnel and Small Gas-gun Experiments with Droplets and Particulates	Stuart Laurence [Virtual]
12:00-1:10	LUNCH	
1:10-1:35	Hypersonic Droplets	Andy Cook, LLNL [Virtual]
1:35-2:00	Shock Profile Initialization for Higher Order Schemes	Austin Goodrich, LLNL
2:00-2:25	Investigating the Formation of Ice Crystal Aggregates and their Impacts on Hypersonic Vehicles	Hallie Boyer Chelmo
2:25-2:50	Fragmentation and Melting of Ice Particles Subjected to Hypersonic Aerothermodynamic Environments	Savio Poovathingal
2:50-3:05	BREAK	


3:05-3:50	Group discussion to define computational test cases for both droplet breakup and droplet impact/damage (possibly with corresponding experiments)	
3:50-4:00	Summary and Next Steps	Tom Schwartzentruber
4:00-4:15	Online discussion (for virtual participants)	
4:15-5:00	Offline discussion	
5:00	BRICC Closes	
5:00	MEETING ADJOURN	
6:00	<i>Happy hour followed by dinner</i>	

 2022 AFOSR/ONR MURI Review Drs. Chiping Li & Eric Marineau December 11-15, 2023 VA -hybrid		
Basic Research Innovation Collaboration Center (BRICC) 4100 N Fairfax Drive, Suite 450 Arlington, VA 22203		
Agenda Day 2 Tuesday, December 12, 2023		
ONR FY2022 MURI Project Development of Validated Hypersonic Plasma Kinetics Models Including Atomic Excitation – Boyd (PI)		
Time	Topic	Speaker
8:05	Check-in/Login	
08:30	Welcome and overview of topic	Eric Marineau (PM), ONR
08:45	Overview of MURI team and Research	Iain Boyd (PI), Colorado
09:00	Molecular experiments	Tim Minton, Colorado
09:30	Molecular computations	George Schatz, Northwestern
10:00	Plasma reactor experiments	Igor Adamovich, Ohio State


10:30	BREAK	
10:45	Shock tube experiments	Ron Hanson, Stanford
11:15	Expansion tunnel experiments	Matt McGilvray, Oxford
11:45	Reduced order kinetics modeling	Robyn Macdonald, Colorado
12:15	LUNCH	
13:15	Flow modeling	Iain Boyd, Colorado
13:45	Summary and next steps	Iain Boyd, Colorado
14:00	Invited talk #1: Cross Beam Experiments	Arthur Suits, Missouri
14:30	Invited talk #2: Plasma Diagnostics	Dick Miles, Texas A &
15:00	Invited talk #3: Shock Tube Experiments	Brett Cruden, NASA Ames
15:30	On-line Discussion, open to all	
16:00	Off-line Discussion, open to Government Team and MURI Team	
17:00	MEETING ADJOURN	

 <p>2022 AFOSR/ONR MURI Review Drs. Chiping Li & Eric Marineau December 11-15, 2023 VA -hybrid</p>		
Basic Research Innovation Collaboration Center (BRICC) 4100 N Fairfax Drive, Suite 450 Arlington, VA 22203		
Agenda Day 3 Wednesday, December 13, 2023		
ONR FY2023 MURI Project Combustion of Solid Fuels in High Enthalpy Flow – Young (PI)		
Time	Topic	Speaker
8:05	Check-in/Login	

08:30	Welcome and overview of topic	Eric Marineau (PM), ONR
08:45	Overview of MURI team and Research	Greg Young (PI), Virginia Tech
0905	Invited Talk – Fast Burning Fuels for Hybrid Propulsion	Brian Cantwell, Stanford
0945	HyChem+: solid polymer combustion reaction modeling	Hai Wang, Stanford
1020	BREAK	
1035	Modeling and Simulation Strategies for Solid Fuel Ramjet Combustion	Suresh Menon, Georgia Tech
1110	Molecular pyrolysis drives polymer-combustion rates (Pre-recorded or on Zoom)	Phil Westmoreland, N.C. State
1145	Invited Talk – Phonon Kinetics and AI/ML for Energetic Materials	Peter Chung, University of Maryland
1225	LUNCH	
1330	Pyrolysis and Combustion of Polymer Fuel and additives	Michael Zachariah, U.C. Riverside
1405	Interfacial and near surface processes during solid fuel combustion from sub- to super- atmospheric pressures	Rich Yetter, Penn State
1440	Combustion of solid fuels in high enthalpy flows	Greg Young, Virginia Tech
1515	Diagnostics for polymer combustion: gas phase evolution and temperature	James Michael, Iowa State
1550	BREAK	
1600	Invited Talk – Measurement Strategies and Neural Data Assimilation for Multiphysics Flows	Samuel Grauer, Penn State
1640	Off-line Discussion	Open to Government Team and MURI Team
1700	MEETING ADJOURN	

 2022 AFOSR/ONR MURI Review Drs. Chiping Li & Eric Marineau December 11-15, 2023 VA -hybrid		
Basic Research Innovation Collaboration Center (BRICC) 4100 N Fairfax Drive, Suite 450 Arlington, VA 22203		
Agenda Day 4 Thursday, December 14, 2023		
ONR FY2021 MURI Project Discovering & Modeling Turbulence and Chemistry Interactions in High Speed Reactive Flows Raman (PI)		
Time	Topic	Speaker
8:05	Check-in/Login	
9:00	Welcome and overview of topic	Eric Marineau (MURI Topic Chief), ONR
9:15	Overview of MURI project and Year 2 progress	Venkat Raman (Lead PI), Department of Aerospace Engineering, University of Michigan
9:45	Multiscale Simulation and Modeling of High-speed Reacting Flows	Venkat Raman, Department of Aerospace Engineering, University of Michigan
10:15	Diagnostic Approaches for High-speed Reacting Flows	Tonghun Lee, Department of Aerospace Engineering, University of Illinois at Urbana-Champaign
10:45	BREAK	
11:00	Uncertainty quantification for learning and inference in reactive flows	Roger Ghanem, University of Southern California
11:30	Balancing Accuracy and Computational Cost: A Multi-Fidelity Approach to Reduced-Order Chemical Modeling	Marco Panesi, Department of Aerospace Engineering, University of Illinois at Urbana-Champaign
12:00	Knowledge gap in high-speed combustion chemistry and its application	Hai Wang, Department of Mechanical Engineering, Stanford University
12:30	LUNCH	
1:30	Aerothermochemistry Effects in the Receptivity Process at High-Enthalpy Conditions	Carlo Scalo, Department of Aerospace Engineering, Purdue University
2:00	Invited Talk: Uncertainty Quantification in Large-Scale Combustion Computations	Habib Najm, Sandia National Lab

2:30	Invited Talk: Shock-turbulence Interactions: From Classical Theories to Current Perspectives	Diego Donzis (Texas A&M)
3:00	Invited Talk: Scramjet Flow Path Simulations: Current Practices and Future Needs	Jack Edwards (NCSU)
3:30	BREAK	
3:45	Summary of project (MURI Team)	
4:00	Closed discussion with MURI Team and PMs	
5:00	MEETING ADJOURN	

 2022 AFOSR/ONR MURI Review Drs. Chiping Li & Eric Marineau December 11-15, 2023 VA -hybrid		
Basic Research Innovation Collaboration Center (BRICC) 4100 N Fairfax Drive, Suite 450 Arlington, VA 22203		
Agenda Day 5 Friday, December 15, 2023		
FY2023 AFOSR MURI Review A Robust Multi-Physics Design Analysis and Optimization Framework for Hypersonic Systems Grounded in Rigorous Model Reduction Charbel Farhat (PI)		
Time	Topic	Speaker
8:05	Check-in/Login	
8:30	Welcome and Opening Remarks	Fariba Fahroo (Topic Chief), AFOSR
8:40	AFOSR MURI Team Overview	Charbel Farhat, Stanford
8:50	A Robust Multi-Physics Design Analysis and Optimization Framework for Hypersonic Systems Grounded in Rigorous Model Reduction	Charbel Farhat, Stanford
9:10	CFD-Based Optimization of a Generic Hypersonic Glide Vehicle	Graham Candler, UMN
9:50	BREAK	
10:00	Adaptive Model Reduction to Accelerate Hypersonic Flow Simulations	Matthew Zahr, Notre Dame

10:40	Construction and Training of Projection-Based Reduced-Order Models for Hypersonic Flows: Accuracy and Performance	Charbel Farhat, Stanford
11:20	Foundations of Controller Co-Design for Hypersonic Flight Applications	Maziar Hemati, UMN
12:00	LUNCH	
13:15	Modeling and Simulation Capabilities Needed to Advance Hypersonic Flight Capabilities	Kevin Bowcutt
14:00	Surrogate Models and Bayesian Inference for Models of Laminar and Turbulent Hypersonic Flows	Jaideep Ray
14:45	BREAK	
15:00	Adaptive Gaussian Process Surrogate Modeling for Hypersonic Vehicle Trajectory Optimization	Matthias Heinkenschloss, Rice
15:40	Trajectory-Informed Multi-fidelity Modeling for the Development of Optimization-Oriented Surrogates	Juan Alonso, Stanford
16:20	BREAK	
16:30	Summary and Next Steps	Charbel Farhat, Stanford
16:45	Discussion, Q&A, and Final Remarks	Fariba Fahroo (Topic Chief), AFOSR
17:00	MEETING ADJOURN	