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	*Happy hour followed by dinner*	

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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**	

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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**	

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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**	

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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**	