

# 2016 AFOSR High Speed Aerodynamics Portfolio Review and ONR Hypersonics Portfolio Review

Drs. Ivett Leyva and Doug Smith | June 27-30, 2016 | Arlington, VA

Basic Research Innovation and Collaboration Center (BRICC)  
4075 Wilson Blvd., Suite 350 | Liberty Room  
Arlington, VA 22203

## Agenda Day 1 | Monday, June 27

Time	Title	Speaker
7:30	Registration	
8:00	Opening Remarks	I. Leyva, AFOSR
8:20	<a href="#">Invited Speaker - Hypersonic Flight Research: The Path Forward</a>	D. Dolvin, AFRL/RQ
<b>Session 1: Shock Boundary Layer Interactions, Chairs: I. Leyva, AFOSR and R. Kimmel, AFRL/RQ</b>		
8:45	<a href="#">3-D Shock/Turbulent BL Interaction Physics: Flow Morphology and System Dynamics through Imposed Disturbances</a>	F. Alvi, FSU D. Gaitonde, OSU N. Clemens, U of TX R. Kumar, FSU B. Thurow, Auburn
9:40	<a href="#">Investigation of 3D Shock-Boundary Layer Interaction: A Combined Approach using Experiments, Numerical Simulations and Stability Analysis</a>	J. Little, U of AZ H. Fasel, U of AZ A. Gross, NMSU
10:20	<b>BREAK</b>	
10:35	<a href="#">Flow Instability Analyses of Shock-Induced Separation Bubbles</a>	P. Martin, U of MD V. Theofilis, Madrid Spain
11:15	<a href="#">Unsteady Separation: Mechanisms and Mitigation</a>	J. Poggie, Purdue U
11:30	<b>LUNCH (Pre-order- closed AFOSR business meeting with PIs)</b>	
12:45	<a href="#">The Effects of Strong Wall Cooling on Supersonic and Hypersonic Shock/boundary-layer Interactions</a>	J. Larsson, U of MD
13:00	<a href="#">ONR - A Systematic Characterization of the Structure and Dynamics of Transitional Shock/boundary Layer Interactions</a>	J. Schmisser, UTSI R. Bowersox, TAMU
13:25	<a href="#">ONR - Analysis and Simulations of the Structure and Dynamics of Transitional Shock/boundary Layer Interactions</a>	G. Candler, U of MN
13:50	<b>BREAK</b>	

14:05	<a href="#">1. (YIP) Investigation of shock boundary layer interactions to unravel the physics of unstart in axisymmetric inlets</a> <a href="#">2. Inlet Isolator and Combustor Physics at Take-Over Region of Scramjet Engines</a>	1. V. Narayanaswamy, NCSU 2. T. Lee, UIUC, V. Narayanaswamy, NCSU
14:40	<a href="#">Characterization of Secondary Flows in Turbulent Supersonic and Hypersonic Corners</a>	J. Hofferth, N. Bisek, B. Rice, S. Peltier, B. Kocher, AFRL/RQ
15:00	BREAK	
<b>Session 2: Shock Boundary Layer Interactions</b> <b>Chair: N. Bisek, AFRL/RQ</b>		
15:15	<a href="#">Measurement of Hypersonic Glide Vehicle Flow Fields</a>	R. Kimmel, AFRL/RQ
15:40	<a href="#">Global Transient Growth Mechanisms in High-Speed Flows with Application to the Elliptic Cone</a>	V. Theofilis, Madrid, Spain
16:05	<a href="#">Cross-flow Instability Receptivity to Environmental Disturbances at Hypersonic Speeds</a>	R. Bowersox, TAMU H. Reed, TAMU
16:30	MEETING ADJOURNED FOR THE DAY	

Agenda Day 2   Tuesday, June 28		
Time	Title	Speaker
7:45	Registration	
8:00	<a href="#">Opening Remarks</a>	D. Smith, ONR
8:10	<a href="#">Invited Speaker - NASA Hypersonic Technology Project - Formulation Overview</a>	K. Rock, NASA LaRC
<b>Session 3: Transition</b> <b>Chair: B. Rice, AFRL/RQ, E. Josyula, AFRL/RQ</b>		
8:35	<a href="#">Passive and Active Patterned Roughness for Cross-flow Transition Control at Mach 6</a>	T. Corke, U of ND T. McLaughlin, USAFA
9:00	<a href="#">Laminar-to-turbulence Transition in Hypersonic Boundary Layers: Mode Interactions and Sensitivities to Mean-flow</a>	T. Zaki, JHU
9:15	BREAK	
9:30	<a href="#">Non-linear Growth and Breakdown Toward Turbulence in Hypersonic Boundary Layers</a>	S. Girimaji, TAMU
9:45	<a href="#">(YIP) Numerical Simulation of Free-stream Acoustic Disturbances in Hypersonic Ground Facilities &amp; Their Effect on BLT</a>	L. Duan, MUS&T (Rolla)
10:10	<a href="#">(YIP) The Influence of Multiple Interacting Primary Modes and Mode Representation on Hypersonic Boundary-layer Stability and Transition Prediction</a>	J. Kuehl, Baylor U
10:35	<a href="#">(HBCU) - The Effect of Multi-mode Induced Transition in a Hypersonic Boundary Layers</a>	S. Smith, Howard U
11:00	<a href="#">Measurements of BL Instability and Transition in the M-6 Quiet Tunnel</a>	S. Schneider, Purdue U
11:25	LUNCH	
12:40	<a href="#">From Hydro-acoustic Control of Compressible Turbulence to High-speed Resonant mode Damping via tuned Wall Impedance</a>	C. Scalo, Purdue U
12:55	<a href="#">Nonlinear Transition Stages in Hypersonic Boundary Layers: Fundamental Physics, Transition Control and Receptivity</a>	H. Fasel, U of AZ
13:20	<a href="#">A DNS Study on Hypersonic BL Receptivity</a>	X. Zhong, UCLA
13:45	<a href="#">(YIP) Plasma-Actuated Flow Control of Hypersonic Crossflow-Induced Boundary-Layer Transition in a Quiet Tunnel</a>	T. Juliano, U of ND
14:00	BREAK	
14:15	<a href="#">ONR - Hypersonic Stability Predictions</a>	H. Reed, TAMU

14:30	Klebanoff Modes in Hiemenz Boundary Layer	P. Ricco, The U of Sheffield, UK
<b>Session 4 - Flow Structure Interactions, Chair: D. Smith, ONR</b>		
14:55	<a href="#">Characterization and Control of a Flap Undergoing Hypersonic FSI</a>	A. Neely, UNSW, Australia
15:10	<a href="#">Developing an Experimental/Computational Methodology to Investigate the Response of Flexible Panels to Shockwave/ boundary-layer Interactions in Hypersonic Flow</a>	S. Laurence, U of MD D. Bodony, UIUC
15:25	<b>BREAK</b>	
15:40	<a href="#">Characterizing Fluid-Structure Interactions on Hypersonic Control Surfaces</a>	K. Casper, SANDIA
15:45	<a href="#">Dynamics of Interactions Between Turbulent Boundary Layers And Compliant Surfaces</a>	J. McNamara, OSU D. Gaitonde, OSU J. Austin, Caltech
1600	<a href="#">Reduced Order Modeling for Hypersonic Aeroelasticity</a>	P. Tiso, ETH, Switzerland
16:05	<a href="#">Direct Numerical Simulation of Compressible Turbulent Flows with Compliant Boundaries</a>	D. Bodony, UIUC
16:30	<b>MEETING ADJOURNED FOR THE DAY</b>	

Agenda Day 3   Wednesday, June 29		
Time	Title	Speaker
7:45	Registration	
8:00	<a href="#">Invited Speaker – Transition Research at Tunnel 9</a>	E. Marineau, AEDC Tunnel 9
<b>Session 5 - Diagnostics and Facility Improvements, Chair: E. Josyula, AFRL/RQ</b>		
8:25	<a href="#">ONR - Advancing Transition Experiments in High Enthalpy Flows</a>	J. Austin, Caltech
8:40	<a href="#">Status of the USAFA Mach 6 Ludwig Tube</a>	G. Abate, USAFA/AFOSR
9:05	<a href="#">Investigating Sensor Characteristics for Scramjet Engine Control</a>	J. Donbar, K. Busa, AFRL/RQ
9:20	BREAK	
9:35	<a href="#">(STTR) Shear Sensors for High Speed, High Temperature Flow Applications</a>	N. Hall, Silicon Audio
10:00	<a href="#">(STTR) Highly-Resolved Wall-Shear-Stress Measurement in High Speed Flows</a>	M. Sheplak, Interdisciplinary Consulting Corp
<b>Session 6 - Non-equilibrium Effects, Chair: R. Kimmel, AFRL/RQ</b>		
10:25	<a href="#">BRI Summary - Thermal &amp; Mechanical Non-equilibrium Effects on Turbulent Flows: Studies of Energy Exchanges thru DNS, Molecular Simulations and Experiments</a>	D. Donzis, TAMU R. Bowersox, TAMU S. North, TAMU B. Hase, TX Tech
11:05	<a href="#">Non-equilibrium and Basic Energy Exchange Mechanisms in High Energy Flows</a>	E. Josyula, AFRL/RQ
11:30	<a href="#">Multi-Step Computational Modeling and Shock-Tube Study of Energy Transfer Processes in High-Enthalpy Air</a>	I. Boyd, U of MI R. Hanson, Stanford
11:45	LUNCH	
13:00	<a href="#">Mechanisms of Energy Transport in Gaseous Media</a>	G. Candler, U of MN
13:25	<a href="#">Rapidly Expanding Non Equilibrium Hypersonic Flow</a>	R. Morgan, A. Veeraragavan, U of Queensland, Australia
13:40	<a href="#">Nonequilibrium Gas-Surface Interactions at High Temperature</a>	T. Schwartentruber, G. Candler, U of MN T. Minton, MSU E. Corral, U of AZ J. Perepezko, U of WI Madison
<b>Session 7 - Subsonic Turbulence and Other Topics, Chair: M. Brown, AFRL/RQ</b>		

13:55	<a href="#">Turbulent BL Over Complex Roughness - Advancing the Predictive Capabilities of Large-Eddy Simulation</a>	C. Pantano, UIUC K. Christensen, U of ND W. Anderson, UT Dallas
14:20	<a href="#">(YIP) Material Mixing and Turbulence in Variable Density Flows</a>	D. Ranjan, GA Tech
14:45	<b>BREAK</b>	
15:00	<a href="#">(YIP) Turbulent Boundary Layer Flows Over Sharp Aerodynamic Drag Transitions</a>	W. Anderson, UT Dallas
15:25	<a href="#">Study of Turbulent Flows using Vectorized Momentum and Energy Addition</a>	S. Roy, UF Gainesville
15:50	<a href="#">Fundamental Turbulence Mechanisms in Multi-Stream Flows</a>	M. Glauser, Syracuse U J. Lewalle, Syracuse U D. Gaitonde, OSU
16:15	<a href="#">New Approaches to Understanding Roughness-Induced Transition</a>	D. Goldstein, UT Austin E. White, TAMU G. Brown, Princeton
16:50	<b>MEETING ADJOURNED FOR THE DAY</b>	

Agenda Day 4   Thursday, June 30		
Time	Title	Speaker
7:45	Registration	
8:00	Invited Speaker	R. Staffin, OSD
<b>Session 8 - Non-equilibrium Effects, Chair: I. Wysong, AFRL/RQ</b>		
8:25	<a href="#">(YIP) A Reduced-order Modeling Approach to Enable Kinetic Simulations of Non-equilibrium Hypersonic Flows</a>	M. Panesi, UIUC
8:50	<a href="#">Non-equilibrium Shock-shock and SBLI</a>	J. Austin, Caltech D. Levin, UIUC
9:25	<a href="#">Exploration of Critical Non-equilibrium Processes in High Speed Viscous Dominated Flows</a>	I. Adamovich, OSU
9:50	BREAK	
10:05	<a href="#">BRI summary - The Multi-scale Interaction of Vibrational Energy Transfer and Turbulent Combustion in Supersonic Flows</a>	P. Varghese, N. Clemens, UT Austin V. Raman, U of MI
10:50	<a href="#">MURI summary, Fundamental Processes in High-temperature Hypersonic Flows</a>	G. Candler, D. Truhlar, T. Schwartzenruber, U of MN A. Van Duin, Penn State E. Corral, U of AZ M. MacLean, U Buffalo D. Levin, UIUC
11:35	<a href="#">The Role Of Kinetic Fluctuations in Laminar-Turbulent Transition of High-Speed Boundary-Layer Flows</a>	A. Tumin, U of AZ
12:00	LUNCH	
13:15	<a href="#">Nonequilibrium Kinetics in High-Enthalpy Air</a>	T. Schwartzenruber, G. Candler, D. Truhlar, U of MN
<b>Session 9 – Turbulence Modeling, Chair: M. Brown, AFRL/RQ</b>		
13:30	<a href="#">Resolvent Analysis for Compressible Wall Turbulence</a>	B. McKeon, Caltech
13:45	<a href="#">Physics Based Modeling of Compressible Turbulence</a>	P. Moin, Stanford U
14:10	<a href="#">(YIP) Theoretical and Experimental Characterization of Turbulent Heat Transfer in Compressible Flows</a>	M. Hultmark, Princeton U
14:25	BREAK	
14:35	<a href="#">Structure and Modeling of Hypersonic Boundary Layers in Post-transitional and Turbulent Regimes</a>	P. Subbareddy, NCSU
14:50	<a href="#">Validation of Models via Comparison with Data for Non-eq Hypersonic Flows</a>	I. Wysong, AFRL/RQ S. Gimelshein, ERC, Inc

<b>Session 10 – Diagnostics and Facility Improvements, Chair: K. Busa, AFRL/RQ</b>		
<b>15:05</b>	<a href="#"><u>(YIP) Instantaneous Velocity Profiles of Wall-Bounded Shear Flows in Thermochemical Non-Equilibrium</u></a>	N. Parziale, Stevens I of Tech
<b>15:20</b>	<a href="#"><u>Hypervelocity Expansion Facility for Fundamental High-enthalpy Research</u></a>	R. Bowersox, TAMU
<b>15:35</b>	<b>BREAK</b>	
<b>15:45</b>	<a href="#"><u>1.Laminar Flow Control in Hypersonic Quiet Nozzle using Wall Suction: Feasibility Studies</u></a> <a href="#"><u>2. Towards a Mechanism-Based Procedure for Predicting Boundary-Layer Transition on Slender Models with Highly Swept Fins</u></a>	S. Schneider, Purdue U
<b>16:10</b>	<a href="#"><u>Femtosecond Laser Electronic Excitation Tagging (FLEET) for Quantitative Measurements in Turbulent Flows</u></a>	R. Miles, Princeton U
<b>16:35</b>	<b>MEETING ADJOURNED FOR THE DAY</b>	