



2023 AFOSR/ONR/HVSI Annual High-Speed Aerodynamics Portfolio Review

Drs. Chiping Li, Eric Marineau; Russ Cummings | July 24-28, 2023 | College Park, MD

Agenda Day 1 | Monday, July 24, 2023 | Eastern Daylight Time (UTC - 4:00)

Time	Thrust Area	Title	PI/Organization
7:45	Zoom Login		
8:00-8:10	Welcome and Opening Remarks		Chiping Li, AFOSR / Eric Marineau, ONR / Russ Cummings, HVSI
8:10-8:15	Propulsion	Introduction to High Speed Propulsion	Program Officers
8:15-8:33	Propulsion	ONR - High Fidelity Simulations of Combustion in High-Speed Propulsion Engines	R. Johnson, NRL
8:33-8:51	Propulsion	ONR - Integration of Physics-Based and Data-Driven Turbulent Combustion Models in the JENRE® Multiphysics Framework and Computational Performance Analysis	P. Pal, ANL
8:51-9:09	Propulsion	ONR- Evaluation, Enhancement, and Application of JENRE on Large-Scale Computing Systems	T. Dunn, LLNL
9:09-9:27	Propulsion	ONR - Combustion Behavior Within a Solid-Fuel Ramjet at High Altitudes	D. Kessler, NRL
9:27-9:35	Propulsion	ONR -Improved Flamelet Progress Variable Approach for Compressible High-Speed Flows (new start)	B. Bojko, NRL
9:35-9:43	Propulsion	ONR - Data-driven, Learning-based, Adaptive Control of Solid Fuel Ramjet (new start)	A. Goel, UMBC
9:43-10:03	BREAK		
10:03-10:21	Propulsion	ONR - Experimental and Numerical Investigation on the Combustion Characteristics of Solid Fuels in Supersonic Combustors	G. Young, Virginia Tech
10:21-10:38	Propulsion	ONR - Combustion in Solid Fuel Ramjets (new start) / Transport Physics in Reacting Turbulent Boundary Layers (wrap up)	C. Slabaugh, Purdue U
10:38-10:46	Propulsion	ONR - Temperature and Compositional Measurements in Model Solid Fuel Ramjet Inlet and Exhaust Flows (new start)	R. Hanson, Stanford U.
10:46-11:04	Propulsion	ONR - High Fidelity Modeling of Hypersonic Air-Breathing Propulsion	T. Taylor, APL
11:04-11:22	Propulsion	ONR - Optimized Simulations of High-Speed Turbulent Combustion	G. Candler, U of MN
11:22-11:30	Propulsion	ONR - Intrinsic Instability of Compressible Reacting Flows and Its Role in Scramjet Unstart and Transition (new start)	A. Polundnenko, UConn
11:30-11:48	Propulsion	ONR - Active Mitigation of Unstart in Scramjets	R. Acharya, UTSI

11:48-12:48	LUNCH		
12:48-13:06	Propulsion	ONR - Mach 4 Inlet Unstart Investigation and Mitigation with Self Energizing Vortex Generating Jets	G. Hobson, NPS
13:06-13:24	Propulsion	ONR - Data-Driven Input-Output Models for Reacting, High-Enthalpy Flows	B. McKeon, Stanford U
13:42-13:47	NEE	Introduction in Non-Equilibrium Effects (NEE)	Program Officers
13:47-14:12	NEE	AFOSR - Spectroscopic Measurements for Recombination Modeling in High-Enthalpy Expanding / Spectroscopic Measurements and Nonequilibrium Modeling for High-Enthalpy Air (new start)	J. Austin, Caltech
14:12-14:27	NEE	AFOSR - Modeling of Recombination in Hypersonic Flows: A Combined Theoretical and Experimental Approach	M. Panesi, UIUC
14:27-14:45	BREAK		
14:45-15:03	NEE	AFOSR - High-fidelity modeling of non-equilibrium gas-phase recombination for hypersonic air flows (YIP)	R. MacDonald, U of CO
15:03-15:21	NEE	AFOSR - Formulation of a General Collisional-Radiative Model for NO to Study Non-Equilibrium, Hypersonic Flows	D. Levin, UIUC
15:21-15:39	NEE	ONR - Deep Learning Closure of Non-Equilibrium Fluid Mechanics	J. MacArt, Notre Dame
15:39-15:54	BREAK		
15:54-16:12	NEE	AFOSR - Wall Temperature and Bluntness Effects in High Enthalpy Hypersonic Separated Flows	S. Gai, UNSW, Australia
16:12-16:30	NEE	AFOSR - Ultra-fast DSMC based on explainable AI for all flow regimes including rarefied hypersonics	S. Myong Rho, Gyeongsang National U, Korea
16:30-16:48	NEE	ONR - Experimental Study of Non-Equilibrium Turbulence-Chemistry Interaction in External Hypersonic Flows	A. Veeraragavan, U of Queensland, Australia
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Agenda Day 2 Tuesday, July 25, 2023 Eastern Daylight Time (UTC - 4:00)			
Time	Thrust Area	Title	PI/Organization
	Zoom Login		
8:00-8:18	NEE	AFOSR - Molecular processes at the extreme temperatures relevant for the hypersonic flight regime	O. Denis Alpizar, Universidad Autonoma de Chile, Chile

8:18-8:36	NEE	AFOSR - Machine Learning for Chemical Reaction Dynamics in High Energy, Rarefied Gas Flow	M. Meuwly, Univ. of Basel, Switzerland
8:36-8:54	NEE	AFOSR - Evaluation of Aerothermochemistry Models Through Sensitivity Analysis and Low-Uncertainty Experiments	I. Boyd, U of CO
8:54-9:12	NEE	AFOSR - Quantification and Mitigation of Thermochemical Non-Equilibrium in High-Enthalpy Hypersonic Wind Tunnels	P. Valentini, AFRL
9:12-9:30	NEE	AFOSR - Energy Exchanges and Transport Phenomena in Aerothermodynamics of High-Speed Platforms	N. Bisek, AFRL
9:30-9:38	NEE	AFOSR - Fundamental Studies of Vibrationally Resolved Air Kinetics in the Vicinity of a Partially Catalytic Surface (new start)	D. Andrienko, U of CO
9:38-9:56	NEE	AFOSR - Topology-Aware Learning and Modeling of High-Rate Dynamic Systems	C. Hu, UConn
9:56-10:16	BREAK		
10:16-10:21	GSI	Introduction to Gas-Surface Interaction (GSI)	Program Officers
10:21-10:39	GSI	AFOSR - Surface catalytic recombination on carbon-based TPS materials	K. Stephani, UIUC
10:39-10:57	GSI	AFOSR - Experimental/Computational Study of Gas-phase and Gas-surface Interactions for High Speed Rarefied Flow (new start)	T. Schwartzentruber, UMin
10:57-11:15	GSI	ONR - Computational and Experimental Study of the Temporal Response of UHTC Materials for Thermal Protection of Hypersonic Vehicles	I. Boyd, U of Colorado
11:15-11:33	GSI	ONR - Forward Thomson Scattering for the Measurement of Weakly Ionized Plasmas in Hypersonic Flows / Characterization of High Enthalpy Flows and Ablation Products Surrounding Hypersonic Platforms (new start)	R. Miles, TAMU
11:33-12:33	LUNCH		
12:33-12:38	FSI	Introduction to Fluid Structure Interactions (FSI)	Program Officers
12:38-12:56	FSI	ONR - Fluid-thermal-structure Interaction of a Finned Model at Mach 6	D. Bodony, UIUC
12:56-13:14	FSI	ONR - Electromagnetic Launch For Hypersonic Research and Development	M. Libeau, NSWCD
13:14-13:32	FSI	ONR - Peridynamic Modeling Development for High Velocity Weather Encounter Damage	I. Guven, VA Commonwealth U
13:32-13:50	FSI	ONR - A Numerical Investigation of Particle and Droplet Impingement for Hypersonic Flow Conditions Including Material Response Modeling	C. Brehm, U of MD
13:50-14:05	BREAK		
14:05-14:23	FSI	AFOSR - The Role of Cavitation in Droplet Breakup: Understanding and Predicting Hypersonic Structural Loading through Multiscale Simulations and Shock-tube Experimentation	S. Grace, Boston U

14:23-14:41	FSI	ONR - Resolving Shock-Driven Droplet Breakup and Evaporation at Hypersonic Conditions	D. Jarrahbashi, TAMU
14:41-14:49	FSI	ONR - Investigating the Formation of Ice Crystal Aggregates and their Impacts on Hypersonic Vehicles (new start)	H. Chelmo, U of North Dakota
14:49-15:07	FSI	ONR - Fragmentation and Melting of Ice Particles Subjected to Hypersonic Aerothermodynamic Environments	S. Poovathingal, U of Kentucky
15:07-15:15	FSI	ONR - Water Entry of Hypervelocity Projectiles (YIP) (new start)	B. Schmidt, Case Western U
15:15-15:23	FSI	ONR - Modeling Support for Water Entry of Hypervelocity Projectiles (new start)	E. Walzer, NSWC_CD
15:23-15:38	BREAK		
15:38-15:46	FSI	AFOSR - Real-Time, High-Fidelity Analysis of Thermal Fluids and Effects on Materials for High-Speed Aircraft Using Data-/AI-Driven Methods (new start)	S. Choi, Gwangju Inst. of Technology, Korea
15:46-16:04	FSI	AFOSR - Hypersonic Vehicle Shape Distortion Sensing with Optical Fibre Bragg Gratings	G. Wild, UNSW, Australia
16:04-16:29	FSI	AFOSR - Unit Cases to Investigate Hypersonic Fluid-Structure Interaction / Hypersonic FTSI Unit Case for a Thermally-Buckled Structural Panel (new start)	A. Neely, UNSW, Australia
16:29-16:47	FSI	AFOSR - Transonic Flutter of Hypersonic Skin-Panels	C. Gaetano, National Cheng Kung U, Taiwan
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Agenda Day 3 Wednesday, July 26, 2023 Eastern Daylight Time (UTC - 4:00)			
Time	Thrust Area	Title	PI/Organization
7:45	Zoom Login		
8:00-8:18	FSI	AFOSR - Experiments on Hypersonic Fluid-Structure Interaction in the Wind Tunnel H2K	D. Daub, DLR
8:18-8:36	FSI	AFOSR - Fluid Structural Thermal Interactions (FSTI) in Hypersonic Flow	V. Narayanaswamy, NCS
8:36-8:54	FSI	AFOSR - Decoding fluid-structural coupling during shock-boundary layer interactions acting on compliant surfaces	J. McNamara, OSU
8:54-9:12	FSI	AFOSR - Measurement and Modeling of an Oblique Shock Grazing a Compliant Panel	D. Bodony, UIUC
9:12-9:17	TF	Introduction to Turbulent Flows (TF)	Program Officers
9:17-9:35	TF	HVSI - Double Cone Experiment in the X3 Expansion Tube	M. McGilvray, Oxford U
9:35-9:43	TF	AFOSR - Theoretical developments in hypersonic turbulent boundary layers with application to friction	S. Pirozzoli, Sapienza, Rome

		and heat transfer estimation (new start)	
9:43-10:03	BREAK		
10:03-10:11	TF	AFOSR - Theoretical developments in hypersonic turbulent boundary layers with application to friction and heat transfer estimation (new start)	J. Larsson, U of MD
10:11-10:29	TF	AFOSR - Influence of Mach number, non-adiabatic walls and nonlinear interactions in resolvent analysis of compressible turbulent boundary layers	B. McKeon, Stanford U
10:29-10:47	TF	HVSI - Evaluation of State-of-the-Art Hypersonic Turbulence Modeling Using M = 6 Benchmark Experiments	M. Semper, USAFA J. Seidel, USAFA
10:47-11:04	TF	ONR / HVSI - Hypersonic Turbulent Heat Transfer Prediction and Validation (wrap up) / High-Speed High-Reynolds-Number Boundary Layer Measurements and Modeling (new start)	R. Bowersox, TAMU
11:04-11:21	TF	ONR - Scaling and Structure in Transitional and Turbulent Hypervelocity Flows (YIP) (wrap up) / Turbulence Quantities in Supersonic and Hypersonic Flows (new start)	N. Parziale, Stevens
11:21-11:38	TF	ONR - Simulation and Modeling of Hypersonic Turbulent Boundary Layers Subject to Pressure Gradient and Wall Cooling (wrap up) / Simulation and Modeling of Hypersonic Turbulent Boundary Layers with Varied Reynolds Numbers and Pressure Gradients (new start)	L. Duan, OSU
11:38-12:48	LUNCH		
12:48-13:05	TF	ONR- A Quasi-Spectral Viscosity (QSV) Dynamic Large-Eddy Simulation Technique for Hypersonic Turbulence (YIP) (wrap up) / Subfilter-scale (SFS) analysis of hypersonic turbulence: a path towards a consistent wall-modeled LES strategy (new start)	C. Scalo, Purdue U
13:05-13:13	TF	ONR - Development of Improved WMLES Capabilities for Hypersonic Flows for Body-Fitted and IBM-based CFD Solvers (new start)	C. Brehm, U of MD
13:13-13:21	TF	ONR - Aerothermal Turbulent Predictions of Relevant, High Reynolds Number Hypersonic Flows using Large Eddy Simulation (new start)	R. Powers, NAWC_AD
13:21-13:39	TF	ONR - Development of Hybrid Simulation Models for Heat Transport in Hypersonic Turbulent Flow	M. Danis, Iowa State U
13:39-13:57	TF	ONR - Aero-Optical Studies of Mixing Flows at Supersonic and Hypersonic Speeds	S. Gordeyev, Notre Dame
13:57-14:17	BREAK		
14:17-14:35	TF	AFOSR - Hypersonic Base Flow Characterization	R. Gosse, U of FL
14:35-14:53	TF	AFOSR - Hypersonic Boundary Layer Turbulence (BOLT-II) Flight Test Experiment	R. Bowersox, TAMU
14:53-15:11	TF	AFOSR - High-Altitude Turbulence and Particulate Measurements Near the BOLT-II Flight Trajectory	B. Argrow, U of Colorado
15:11-15:31	BREAK		

15:31-15:49	TF	AFOSR - DNS and Constrained Nonlinear Analysis of the BOLT-II Flight Experiment	G. Candler, U of MN
15:49-16:07	TF	AFOSR - Research in Support of Flight Experiment BoLT 2: Simulations and Characterization of the Turbulent Flow Regime	P. Martin, U of MD
16:07-16:25	TF	AFOSR - Advanced Ground Testing and Simulation of the Boundary Layer Transition (BOLT) Flight Experiment	A. Veeraragavan, U of Queensland, Australia
16:25-16:33	TF	AFOSR - Assessment of the Applicability of Quantum Computation for Solving the Problem of Numerical Hypersonic Flow (new start)	D. Ahn, U of Seoul
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Agenda Day 4 Thursday, July 27, 2023 Eastern Daylight Time (UTC - 4:00)			
Time	Thrust Area	Title	PI/Organization
7:45	Zoom Login		
8:00-8:05	Transition	Introduction to Hypersonic Boundary Layer Transition	Program Officers
8:05-8:18	Transition	AFOSR - Growth and Control of Nonlinear Gortler Vortices in Hypersonic Boundary Layers Over Concave Surfaces	P. Ricco, Sheffield U, England
8:18-8:36	Transition	AFOSR - Boundary Layer Transition (BOLT) Post-Flight Research and BOLT II Flight Test Support	B. Wheaton, JHU/APL
8:36-8:54	Transition	AFOSR - Laminar-Turbulent Transition Prediction on Three-Dimensional Wings, including Airfoil Shape Optimization	V. Theofilis, Universidade de Sao Paulo, Brazil
8:54-9:12	Transition	ONR - Receptivity to Breakdown Mechanisms During Transition on Hypersonic Forebodies	D. Gaitonde, OSU
9:12-9:30	Transition	ONR - Transition Prediction and Control for Blunt Hypersonic Configurations with Hemispherical and Ogival Nostips (wrap up) / Receptivity and Transition over Blunt Configurations under Noisy and Quiet Hypersonic Conditions (new start)	P. Paredes Gonzalez, Nat. Inst. Of Aerospace
9:29-9:47	Transition	AFOSR - Novel Concepts for Transition Delay in Hypersonic Boundary Layers and their Optimization	P. Paredes Gonzalez, Nat. Inst. Of Aerospace
9:47-10:07	BREAK		
10:07-10:24	Transition	ONR - Input/Output Analysis of Complex Hypersonic Boundary Layers (wrap up) / Instability and Receptivity of Complex Hypersonic Flows using Input/Output Analysis (new start)	J. Nichols, U of MN
10:24-10:49	Transition	AFOSR - Stagnation Point Injection in Hypersonic Flow / Effect of Particulates and Free Stream Disturbances on Hypervelocity Boundary Layer Transition (new start)	B. Schmidt, Case Western U

10:49-11:07	Transition	ONR - Detailed Investigation of Hypersonic Instability, Breakdown, and Natural Transition under Quiet Flow with Simulated Ablation-Gas Injection	J. Jewell, Purdue U
11:07-11:25	Transition	AFOSR - A Numerical Investigation of Transpiration Cooling for Transitional and Turbulent Flows over Slender Bodies	C. Brehm, U of MD
11:25-11:43	Transition	AFOSR - Boundary Layer Transition 1B (BOLT1B) Flight Experiment	B. Wheaton, JHU/APL
11:43-12:43	LUNCH		
12:43-12:53	Transition	ONR - High Reynolds Number Quiet MACH 6 Swept-Fin Cone Experiments: Flow Instabilities and Transition Control (wrap up)	T. Corke, Notre Dame
12:53-13:03	Transition	ONR - Hypersonic Finned Cones (wrap up)	H. Reed, TAMU
13:03-13:21	Transition	ONR - Assessment of Hypersonic Transition and Turbulent Heating Prediction Methods for Complex Geometries (HTT Project)	D. Araya, APL N. Bitter, APL
13:21-13:39	Transition	ONR - One-way Navier-Stokes for transition prediction in high-speed boundary layers	T. Colonius, CalTech
13:39-13:49	Transition	ONR - Predicting hypersonic laminar-turbulent transition with direct numerical simulation (wrap up)	J. Poggie, Purdue U
13:49-14:07	Transition	AFOSR - Experimental study of the effect of nose bluntness on hypersonic boundary-layer transition	A. Craig, U of AZ
14:07-14:22	BREAK		
14:22-14:40	Transition	AFOSR - Numerical Investigation of Non-linear Transition Stages in Hypersonic Boundary Layers for Wind-Tunnel and Free-Flight Conditions	H. Fasel, U of AZ
14:40-14:58	Transition	HVSI - Development and Testing of RANS Transition Models for Hypersonic Boundary Layers	H. Fasel, U of AZ
14:58-15:16	Transition	HVSI - Hypersonic Transition Modeling Using an Amplification Factor Transport Equation	J. Coder, U of Tennessee
15:16-15:34	Transition	ONR - Wave Packets in High-Speed Boundary Layers	E. Kerschen, U of AZ
15:34-15:52	Transition	AFOSR - Novel Concepts for Transition Delay in Hypersonic Boundary Layers and their Optimization	P. Paredes Gonzalez, Nat. Inst. Of Aerospace
15:52-16:10	Transition	AFOSR - Competing instability mechanisms in hypersonic boundary layers	J. Kuehl, U of Delaware
16:10-16:25	BREAK		
16:25-16:43	Transition	AFOSR - Effects of Thermal Gradients on Boundary Layer Transition Mechanisms	J. Kuehl, U of Delaware
16:43-17:01	Transition	AFOSR - Hypersonic boundary-layer transition on control surfaces with separation bubbles	S. Schneider, Purdue U
17:01-17:19	Transition	AFOSR - An Alternative Approach Towards Investigating Stability and Transition (Fokker-Plank)	S. Gai, UNSW, Australia
17:19-17:37	Transition	HVSI - Measuring the influence of wall-temperature ratio distribution on transition using optical diagnostics	S. O'Bryne, UNSW, Australia
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Agenda Day 5 Friday, July 28, 2023 Eastern Daylight Time (UTC - 4:00)			
Time	Thrust Area	Title	PI/Organization
7:45	Zoom Login		
8:00-8:05	SBLI	Introduction to Shock-Boundary Layer Interactions (SBLI)	Program Officers
8:05-8:23	SBLI	AFOSR - Nonlinear Flow Receptivity in Shock-Wave Boundary-Layer Interaction	G. Rigas, Imperial College, England
8:23-8:31	SBLI	AFOSR - Shock-Boundary Layer Interactions in Supersonic Turbine Cascades (new start)	W. Wolf, Universidade Estadual de Campinas, Brazil
8:31-8:48	SBLI	ONR - A Comprehensive Investigation of Transitional Shock Boundary Layer Interaction Using Experiments, Simulations and Stability Theory (wrap up) / Investigation of Transitional SBLI at Mach 5 using Controlled Forcing: Experiments, Simulations and Theory (new start)	J. Little, U of Arizona
8:48-8:58	SBLI	ONR - Experimental Investigation of Unsteadiness in Swept Hypersonic Shock-Wave / Boundary-Layer Interactions (wrap up)	S. Laurence, U of MD
8:58-9:08	SBLI	ONR - Characterization of the Structure and Dynamics of Transitional Shock/Boundary Layer Interactions (wrap up)	J. Schmisser, U of TN
9:08-9:33	SBLI	ONR - Multi-scale Modeling of Unsteady Shock-Boundary Layer Hypersonic Flow Instabilities / Kinetic Treatment of Sources and Mechanisms that Drive Unsteady, Shock-dominated Flow Instability (new start)	D. Levin, UIUC
9:33-9:51	SBLI	AFOSR - Study of Shock-Wave/Boundary-Layer Interaction on the STORT Configuration	S. Willems, DLR
9:51-10:11	BREAK		
10:11-10:29	SBLI	AFOSR - Turbulent Separation and Unsteadiness in Compound Shock/Boundary Layer Interactions	F. Alvi, FSU
10:29-10:47	SBLI	ONR - The Origin and Scaling of Low-Frequency Unsteadiness in Shock-Separated Boundary layers using DNS, LES and Input/Output Analyses	P. Martin, U of MD J. Nichols, UMin
10:47-11:05	SBLI	AFOSR - Hypersonic Boundary-Layer Response to Localized Shock-Induced Vorticity	M. Borg, AFRL/RQ
11:05-11:23	SBLI	AFOSR - Investigation of the effects of ablation-induced distributed roughness on shock-wave/boundary-layer (YIP)	C. Combs, UTSA
11:23-11:41	SBLI	ONR - Improved Simulation of Internal and External Hypersonic Flows using High-Order Implicit Shock Tracking (YIP)	M. Zahr, Notre Dame
11:41-11:59	SBLI	ONR - High-Order Implicit Shock Fitting for Three-Dimensional Hypersonic Flows	A. Kercher, NRL

11:59-13:09	LUNCH		
13:09-13:14	DFI	Introduction to Diagnostics, Facilities and Instrumentation (DFI)	Program Officers
13:14-13:22	DFI	ONR - Development of spontaneous Raman spectroscopy for optical diagnostics in detonation engines (new start)	P. Varghese, UT Austin
13:22-13:40	DFI	ONR - Arc-Jet Freestream Turbulence Characterization and its Influence on Laminar Heating Augmentation in the Stagnation Region	L. Maddalena, UTA
13:40-13:57	DFI	ONR - Spectrally-Resolved Laser Diagnostics for High-Enthalpy Flow Measurements (new start) /Spectrally-Resolved Laser Diagnostics for High-Enthalpy Flow Sensing (wrap up)	R. Hanson, Stanford U.
13:57-14:15	DFI	ONR - Development and Assessment of Detonation-Drivers for Hypervelocity Expansion Tube Ground Testing	J. Shepherd, Caltech
14:15-14:33	DFI	AFOSR - Canonical Validation Experiments for Fundamental Hypersonic Aerodynamics	C. Limbach, U of MI
14:33-15:03	BREAK		
15:03-15:11	DFI	AFOSR - Development of Advanced Off-Surface Flow and Thermodynamic Measurements in Hypersonic Environments (new start)	J. Sutton, OSU
15:11-15:29	DFI	AFOSR - New Mexico Basic Research Center of Excellence for Hypersonic Sensor Development and Testing	L. Cifuentes, NMSU
15:29-15:37	DFI	AFOSR - Technology Development for High-Temperature Sensors (new start)	M. Sheplak, U of Florida
15:37-15:55	DFI	AFOSR - "Async-ELF": 10k USD, 1kg, 100kHz-Equivalent 3D Optical Diagnostics for Hypersonic Testing	T. Puayen, National Yang Ming Chiao Tung U, Taiwan
15:55-16:13	DFI	AFOSR - Non-Intrusive, Reliable, and Portable Laser Induced Breakdown Spectroscopy for Instantaneous Gas Composition and Density Measurements in High-Speed Flows	H. Do, Seoul National U, Korea
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