

Thermophysics

Papers Presented at the AIAA AVIATION 2026 Forum

San Diego, California, USA
8-12 June 2026

ISBN: 979-8-3313-3872-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 12700 Sunrise Valley Drive, Suite 200, Reston, VA 20191, USA.

TABLE OF CONTENTS

Coupled Finite-Rate Ablation, Pyrolysis, and State-Specific Flowfield Effects on Radiation Spectra	1
<i>Sung Min Jo, Hyeon Woo Nam</i>	
Alkali Metal Seeding for Enhanced Ionization in Hypersonic Flight.....	9
<i>Walter B. Richardson, Vamsikrishna Pasumarthi, Shelby Horth, Ana Tuba, Brad Porter, Nahid Rahman, Kyle M. Hanquist</i>	
Computational Modeling of Recombination Processes in High Enthalpy Flows.....	42
<i>Samuel Crow, Narendra Singh</i>	
Effects of Non-Thermal Surface Recombination on Wall Heating Under State-To-State Vibrational Kinetic Modeling in a Two-Dimensional Boundary Layer	63
<i>Bryan H. Durham, Daniil Andrienko</i>	
A Comparative Study of First Grid Height Estimation Methods for Hypersonic Flow Including the Eckert-Temperature Based Approach.....	85
<i>Görkem Atay, Kutay C. Yapici</i>	
Electronic State-Resolved Model Sensitivities for Nitric Oxide Radiation in Hypersonic Flows.....	114
<i>Sindhu Manchikanti, Timothy T. Aiken, Iain D. Boyd</i>	
Quantified Uncertainties Due to Continuum Assumption in Strong Non-Equilibrium Flows.....	148
<i>Mritunjay Nidharia, Steven Minniear, Narendra Singh</i>	
Influence of Surface Chemistry on Coupled CFD-Radiation Simulations for Hypersonic Atmospheric Entry.....	161
<i>Alessandro Meini, Sung Min Jo, Marco Panesi</i>	
Uncertainty-Aware Air Carbon Ablation Model from Molecular Beam Data	173
<i>Anabel Del Val, Graham J. Larson</i>	
Ultrasonic Monitoring of Ablation in Ceramic-Coated Thermal Protection Materials.....	195
<i>Shehar Bano, Paul Fraser, Graham Wild</i>	
Computational Analysis of Plasma Jet Flow Over a Wedge Geometry in the PlasmatronX ICP Facility.....	211
<i>Abhyudaya Singh, Alessandro Munafò, Kelly Stephani, Marco Panesi</i>	
A Machine Learning Augmented Approach for Heat Transfer Analysis of High-Speed Systems	228
<i>Robert W. Tramel</i>	
Definition and Evaluation of Continuum Breakdown Parameters.....	250
<i>Federica Portis, Domenic D'Ambrosio, Antonio Schettino</i>	
Boundary Layer Analysis of Shock Tube Flows	263
<i>Andrea Fagnani, Olivier Chazot, Brett A. Cruden</i>	
CFD Simulations of the Truncated IHF Semi-Elliptical Nozzle Arc-Jet Facility: A Plate Deflection Study.....	277
<i>Tahir Gokcen</i>	

Master-Equation-Informed Reduced-Order Model for Thermal Non-Equilibrium Dissociation: Application to N ₂	297
<i>Albert Zhou, Alex T. Carroll, Guillaume Blanquart</i>	
Partially Catalytic Boundary Effects on Shock Boundary-Layer Interactions	312
<i>Ariel Blanco, Nicholas J. Bisek</i>	
Initial Assessment of the SHOTT Nozzle Flow Using the Master Equation Model.....	325
<i>Daniil Andrienko, Iain D. Boyd</i>	
The Effect of Turbopan-Representative Distortion on Surface Heat Exchanger Performance	337
<i>David A. Stewart, John D. Coull, Peter Ireland</i>	
A Compact Low-Loss Additive-Manufactured Redirecting Heat Exchanger (CLARE): Numerical Benchmark of Aerothermal Performance	350
<i>Jürgen Inkoferer, Dragan Kozulovic, Martin Bitter</i>	
A Compact Low-Loss Additive-Manufactured Redirecting Heat Exchanger (CLARE): Experimental Validation Strategy & First Results	361
<i>Martin Bitter, Simon Dankerl, Jürgen Inkoferer, Dragan Kozulovic</i>	
Vascular Transpiration in a Carbon-Carbon Composite Leading Edge	373
<i>Mark Olima, Mohammed Ammar Abdul Latheef, William Lepage, Hema Ramsurn, Michael Keller</i>	
Parametric Study of Rain Droplet Interactions with a Hypersonic Vehicle.....	382
<i>Christopher A. Roseman, Connor W. Morency, Iain D. Boyd</i>	
A Multi-Solver Approach for Particle-Laden Hypersonic Flows	399
<i>Hyeon Woo Nam, Sung Min Jo</i>	
An Experimental Investigation on Convective Heat Transfer Characteristics of a Human Hand Model Exposed to Frozen-Cold Winds.....	409
<i>Syed Haque, Abdelrahman Alremawi, Jincheng Wang, Mengying Zhang, Rui Li, Guowen Song, Hui Hu</i>	
Experimental Investigation of Cryogenic Tank Chilloff and Boil-Off Phenomena Using Liquid Nitrogen.....	424
<i>Alessandra Zumbo, Francesca De Carlo, Cristina Bertani, Andrea Ferrero, Filippo Masseni, Dario Pastrone</i>	
Tree-Based Surrogate Modelling of Aerothermochemistry for Space Debris Reentry.....	438
<i>Jeanne S. Longlune, Thierry Magin, Aurelie Bellemans</i>	
Optimizing Experiments for Thermochemistry Model Validation Using Bayesian Experimental Design.....	468
<i>Agnivo Ghosh, Anabel Del Val</i>	
ML-Accelerated Investigation of Atomistic Hardening Mechanisms in MPEAs.....	488
<i>Nafiz Imtiaz, Patrick Manyin, Maitreyee Sharma Priyadarshini</i>	
Physics-Constrained Surrogate Model for Non-Boltzmann Radiative Heat Transfer	505
<i>Rithik Dhandapani, Sung Min Jo</i>	
Data-Driven Design of Single-Phase High-Entropy Ultra-High-Temperature Ceramics.....	521
<i>Mashaekh Tausif Ehsan, Alejandra G. Castellanos, Maitreyee Sharma Priyadarshini</i>	

Mixed Uncertainty Quantification for Hypersonic Entry into Hydrogen-Helium Atmospheres	537
<i>Cate Leszcz, Timothy T. Aiken, Iain D. Boyd</i>	
Evaluation of B-Si-C Chemistry Models in High-Enthalpy Air Experiments	562
<i>Nicholas S. Campbell, Iain D. Boyd, Douglas Fletcher</i>	
Conservative Numerical Modeling of an Ablative Charring Heat Shield Under Deformations Validated Through Arc-Jet Tests.....	577
<i>Alexis Cas, Céline Baranger, H��lo��se Beaugendre, Simon Peluchon</i>	
Development and Testing of a New Slug Calorimeter for Plasma Wind Tunnels	604
<i>J.O. Flores Govea, Hisham K. Ali</i>	

Author Index