

Atmospheric and Space Environments

Papers Presented at the AIAA SciTech Forum and Exposition
2025

Orlando, Florida, USA
6-10 January 2025

ISBN: 979-8-3313-1830-7

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 34922 Uwytkug'Xcmg{'Ftkxg."Uwkg"422, Reston, VA 20191, USA.

TABLE OF CONTENTS

LUNAR ENVIRONMENTS AND EFFECTS ON LUNAR EXPLORATION

Lunar Dust Adhesion Mitigation Using Modified Surfaces	1
<i>Avi Waghray, Miquela B. Smith, Caleb K. Thompson, Justin Astacio, Maximus Mendez, Zeba Momin, Ahuna Tristan, Luizandrei E. Galanida, Joanna Jose, Ashley Tirado Pujols, Seetha Raghavan</i>	
Design Environment for Lunar Operations and Systems Architecting	11
<i>Paul Boyer, Sean Park, Cornelia Jerresand, Siddharth Sambath Ramkumar, Michael G. Balchanos, Olivia J. Pinon-Fischer, Dimitri Mavris</i>	
Dust Sensing and Mitigation Architectures for a Pioneer Lunar Base	32
<i>Siva Muniyasamy, Jekan Thangavelautham</i>	
Investigating the Resilience of 8 Mol % Ytria-Stabilized Zirconia Coatings for Lunar Environments.....	47
<i>Ashley Tirado Pujols, Zachary Stein, Christopher Wohl, Valerie Wiesner, Seetha Raghavan</i>	

OTHER TOPICS IN MVCE AND ASE

3D Real-Time Augmented Reality Weather Visualizations for Aircraft Safety During Flight	57
<i>Brady M. Phelps, Chad Mourning</i>	
A Parametric Study of Aircraft Lightning Strike Analysis and Risk Assessment.....	66
<i>Youssef Lamrini, Evan Harrison, Dimitri Mavris</i>	
Unique Approaches for Developing CFD Coupled 6DOF Simulations When Studying Tumbling Bodies.....	80
<i>Hunter J. Dennison, Nathaniel Michek, Wade Huebsch, Christopher Griffin</i>	

ATMOSPHERIC AND SPACE ENVIRONMENTS

Self-Consistent Calculations of Satellite Surface Potential and the Resulting Drag Coefficient with Varied Ionospheric Composition	106
<i>Atefeh Fazl Najafabadi, Tejaswi Shinde, Tulasi N. Parashar, Iver H. Cairns, Jason M. Held, Jakub Glowacki</i>	
A Ground Vacuum Facility for Simulating Cryogenic Space Environment Conditions.....	117
<i>Emmanuel K. Wie-Addo, Lucas Scott, Daoru Han</i>	
Initial On-Orbit Results from the Electric Propulsion Electrostatic Analyzer Experiment (ÈPÈÈ)	129
<i>Carlos A. Maldonado, Rachel Ulrich, Kelly Moran, Ky Potter, Lauren Castro, Pedro A. Resendiz Lira, Tyler Eddy, Susan M. Klem, Jani Janhunnen, Gian Luca Delzanno, Justin McGlown, Brian Weaver, Richard Balthazor, John D. Williams, Matthew G. McHarg</i>	
Satellite Velocity Analysis in Earth Orbit.....	146
<i>Kolemann Lutz</i>	
Dragonfly: An Evaluation of the Unsteady Aerodynamics of Heatshield Separation on Titan	154
<i>Edward G. Clutter, Michael P. Kinzel</i>	

Making a Twenty-Year Prediction: The Potential Meteorology of Uranus During an Orbiter/Probe
Mission 168
Raymond P. Lebeau

Author Index