

# **Aerodynamic Decelerator Systems Space I**

Papers Presented at the AIAA Aviation Forum 2024 and  
ASCEND 2024

Las Vegas, Nevada, USA  
29 July – 2 August 2024

ISBN: 979-8-3313-0577-2

**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.'Uwky'422, Reston, VA 20191, USA.

# TABLE OF CONTENTS

## **AERODYNAMIC DECELERATOR SYSTEMS SPACE I**

Preliminary Design of the Supersonic Disk-Gap-Band Parachute for Sample Retrieval Lander .....	1
<i>Katie J. Siegel, Clara O'Farrell, Jeremiah Rowan, Kirin Peterson, Charles Lowry</i>	
Permeability of the Sample Retrieval Lander's Candidate Parachute Fabric .....	15
<i>Clara O'Farrell, Katherine J. Siegel, Cristian Navarro, Charles Lowry</i>	
Permeability Modeling of Mars Parachute Broadcloth Materials .....	46
<i>Seyed Danial Ghasimi, Jason Rabinovitch, Luis Chacon, Savio J. Poovathingal, Cutler Phillippe, Collin Foster, Marco Mattei, Laura Villafañe Roca, Francesco Panerai, Faisal As'Ad, Philip Avery, Charbel Farhat, Marcus Lobbia, Navid Ataei</i>	
Integrated Main Parachute Air Drop Test for Gaganyaan Mission .....	78
<i>Abdul Salam Pm, Johns Paul, Santhosh J Nalluveetil, Vineeth Gm, Sunoj M</i>	

## **AERODYNAMIC DECELERATOR SYSTEMS SPACE II**

Mars Sample Return Earth Entry System Helicopter Drop Test Reconstruction .....	87
<i>Chris D. Karlgaard, Rohan G. Deshmukh, Mark Schoenenberger, Michael Manwell, James M. Corliss</i>	
Sample Retrieval Lander Parachute System Deployment Test Campaigns: Modeling, Testbed Development, and Intermediate Results .....	105
<i>Kirin Peterson, Katherine J. Siegel, Kenneth Whalen-Muse, Clara O'Farrell, Charles Lowry, Max Kester</i>	
Results from the Helicopter Drop Test of the DAVINCI Descent Sphere .....	122
<i>Soumyo Dutta, Nelson G. Guecha-Ahumada, Matthew Andreini, Christopher Karlgaard, Matthew Chan</i>	
An Investigation of the Dragonfly Mission Aeroshell/Parachute Dynamics Through Subscale Drop Tests .....	137
<i>Juan Cruz, Justin Shafner, Brian Duvall, Matthew Gray, Imran Khasawneh, Christopher Meek, Jody Miller, Brayden Chamberlain</i>	
Video Analysis for Surveillance of Spacecraft Parachute Systems .....	151
<i>Samuel A. Janssen, Eric S. Ray, Aaron L. Morris</i>	

## **AERODYNAMIC DECELERATOR SYSTEMS MODELING & SIMULATION**

Fluid-Structure Interaction Simulations of Supersonic Parachute Inflation: Model Sensitivities .....	167
<i>Francois Cadieux, Michael F. Barad</i>	
Fluid-Structure Inflation Simulations of a Parachute with High-Speed Dynamic Reefing .....	193
<i>Carlos Pantano, Roberto Montanez</i>	
Sensitivity Analysis and Validation of a Computational Framework for Supersonic Parachute Inflation Dynamics .....	202
<i>Faisal As'Ad, Philip Avery, Charbel Farhat, Jason Rabinovitch, Marcus Lobbia, Navid Ataei</i>	

Uneven Inflation Load Share Trends in Clusters.....	230
<i>Jean Potvin, Eric S. Ray</i>	

## **AERODYNAMIC DECELERATOR SYSTEMS AIRDROP**

Simulation and Stability Analysis of a Coupled Parachute-Payload System.....	245
<i>Keith Bergeron, Mehdi Ghoreyshi, Adam Jirasek</i>	

Design, Test and Simulation of the Joint Light Tactical Vehicle (JLTV) Gravity Airdrop System (GADS) .....	261
<i>Usbaldo Fraire</i>	

Modeling & Simulation of the Rapid Rigging & De-Rigging Airdrop System (RRDAS).....	269
<i>Usbaldo Fraire</i>	

Variability of Mechanical Properties of Parachute Canopy Fabrics Relevant to Deployment .....	279
<i>Alireza Amirkhizi, Fernando Campos, Fatemeh Seyhani, Alexander Krueger, Patrick Drane, James Sherwood, Christine Charette, Allen Witkowski</i>	

A Novel Energy Dissipator; With Bespoke Geometry Enabled by Additive Manufacturing .....	288
<i>Andrew Lloyd, Kc Wong</i>	

Bleed Air Actuation for a Single Surface Parafoil.....	300
<i>Donald J. Ward, Andrea L. Vu, Mark Costello</i>	

## **Author Index**