

6th Propulsion Aerodynamics Workshop Special Session - Nozzle

Papers Presented at the AIAA SciTech Forum and Exposition
2024

Orlando, Florida, USA
8 – 12 January 2024

ISBN: 979-8-3313-0440-9

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 Uwptkug'Xcmg{ 'F tkxg."Uwkug"422, Reston, VA 20191, USA.

TABLE OF CONTENTS

6TH PROPULSION AERODYNAMICS WORKSHOP SPECIAL SESSION - NOZZLE

Summary of the 6th AIAA Propulsion Aerodynamics Workshop Nozzle Test Case: Heated Supersonic Axisymmetric Jets (Invited)	1
<i>Nicholas J. Georgiadis, Mark P. Wernet, Chad M. Winkler, Stuart I. Benton, Brian J. Connolly</i>	
Turbulence Model Assessment for Heated Supersonic Jets.....	31
<i>Conrad Kramer, Darrell S. Crowe</i>	
Modeling of Turbulent Supersonic Jet Plumes Using CFD++	45
<i>Amarnatha Sarma Potturi, Paul Batten, Nili Bachchan, Oshin Peroomian</i>	
BCFD Analysis for the 6th AIAA Propulsion Workshop: Nozzle Results	58
<i>Chad M. Winkler</i>	
High-Fidelity SBES Simulations for Supersonic Nozzle Exhaust Flows.....	77
<i>Krishna Zore, Cristhian Aliaga, Jeya Selva, Laith Zori, Boris Makarov</i>	

6TH PROPULSION AERODYNAMICS WORKSHOP SPECIAL SESSION - INLET

Summary of the 6th Propulsion Aerodynamics Workshop: NASA 1507 Inlet	106
<i>Miguel Moreno, Pavlos K. Zachos, Erick J. Gant, Luiz Tobaldini Neto, Diego Ferolla de Abreu, Neal D. Domel, John W. Slater</i>	
Wind-US Simulations of the NASA 1507 Inlet Test Case.....	139
<i>John W. Slater</i>	
Bleed Modeling Considerations for the NASA 1507 Mixed-Compression Inlet	155
<i>Stuart I. Benton</i>	
A Hierarchy of NASA 1507 Inlet Simulations Using CFD++.....	169
<i>Nili Bachchan, Paul Batten, Oshin Peroomian, Amarnatha Sarma Potturi</i>	
Results and Overview of Baseline Meshes and Adaptive Mesh Refinement for the AIAA PAW 6 Mixed Compression Inlet	189
<i>Neal D. Domel, Erick J. Gant</i>	
Numerical Simulations of a Mach 3.0 Mixed-Compression Air Intake	207
<i>Diego Ferolla de Abreu, Kelvin C. de Moraes, Luiz Tobaldini Neto, Luis Gustavo Trapp, Andre Maurice H. Lombardi</i>	

EMBEDDED INLETS AND FAN DISTORTION EFFECTS

Engine Integration for a Fuselage Embedded Engine Configuration and the Effect of BLI on Fan Performance.....	223
<i>Niraj Iyer, Legin Benjamin, Christoph Bode</i>	
Performance Characteristics of a Boundary Layer Ingesting Inlet - Distortion Tolerant Fan Through CFD Code Coupling.....	242
<i>Gregory Heinlein, Ercan Dumluipinar, Jeffrey A. Housman, James Jensen</i>	

Dynamic Swirl Distortion Characteristics in S-Shaped Diffusers Using UCNS3D and Time-Resolved, Stereo PIV Methods.....	257
<i>Tommaso Piovesan, Matteo Migliorini, Pavlos K. Zachos, Panagiotis Tsoutsanis</i>	
Flow Distortion Reduction by Blade Cascades, Part 1: Adjoint Optimization.....	272
<i>Pavel Danilov, Alexander Boschitsch, Abrar Ul Karim, Tamara Guimaraes Bucalo</i>	
Flow Distortion Reduction by Blade Cascades, PART 2: Experimental Validation	292
<i>Abrar Ul Karim, Tamara Guimaraes Bucalo, Pavel Danilov, Alexander Boschitsch</i>	
Aerodynamic Measurements and Benefit Quantification of a Boundary Layer Ingested Propulsion System	305
<i>Ibrahim Soner Bilyaz, Özge Baskan Percin</i>	

INLET DESIGN AND PERFORMANCE

Multipoint Aerodynamic Design of Three Dimensional UHBR Engine Intakes.....	312
<i>Legin Benjamin, Lennart Harjes, Jens Friedrichs</i>	
Unsteady Swirl Distortion in a Short Intake Under Crosswind Conditions	337
<i>Tommaso Piovesan, Pavlos K. Zachos, David G. MacManus, Christopher Sheaf</i>	
Effects of Inflow Boundary Layer on Supersonic Inlets	353
<i>Gargi Dashora, Unnikrishnan Sasidharan</i>	

NOZZLE DESIGN AND PERFORMANCE

Numerical Investigation of Local Adverse Pressure Gradient in Shape Changing Nozzles.....	364
<i>Roshan V. Baskaran, Daniel R. Cuppoletti</i>	
Design Optimisation of Separate-Jet Exhausts with CFD In-The-Loop and Dimensionality Reduction Techniques.....	379
<i>Josep Hueso-Rebassa, David G. MacManus, Fernando Tejero, Ioannis Goulos, Chawki Abdessemed, Christopher Sheaf</i>	
Thrust Vectoring Using Differential Throttling in Axisymmetric Aerospike Nozzle	396
<i>Roberto Marsilio, Emanuele Resta, Gaetano Di Cicca, Michele Ferlauto</i>	
Acoustic and Flowfield Characteristics of a 2:1 Aspect Ratio Supersonic Rectangular Jet	407
<i>Kimone L. George, Burak Tuna, Jonas Gustavsson, Rajan Kumar</i>	

TEST RIG DESIGN AND MEASUREMENTS IN HIGH-SPEED FLOWS

Characterization of Unsteady Shock Motion in a Transonic Diffuser Flow Path.....	424
<i>Stuart I. Benton, Spencer L. Stahl, Daniel Reilly</i>	
Wind Tunnel Installation Effects on the Base Flow for a High-Speed Exhaust System.....	443
<i>Spyros Tsentis, Ioannis Goulos, Simon Prince, Vassilios Pachidis, Vladeta Zmijanovic, José Saavedra</i>	
Supersonic Passage Startability in a Water Table	465
<i>Kevin Boes, Stephen Bean, John A. Grunenwald, Adam Moeller, Lukas B. Inhestern, Guillermo Paniagua</i>	

Optimization of Plug Nozzles Using CFD Informed Design Space Querying..... 476
John Henry Korth

Turbulent Wake Transport in the Open Jet of a Convergent Nozzle and Through a Shape
Transitioning Nozzle 487
Keerthan Ganeshan, Vincent A. Onoja, Daniel R. Cuppoletti

**CLEAN AVIATION SPECIAL SESSION: ADVANCED ENGINE AND AIRCRAFT
CONFIGURATIONS**

Clean Sky 2 Advanced Rear End Demonstrator 509
Enrique Guinaldo

Hybrid Laminar Flow Control Activities Within the Frame of Clean Sky 2 524
*Martin Wahlich, Alexander Bismark, Martin Radestock, Kfir Menchel, Matthieu Milot, David
Cruz*

Final Design, Manufacturing and Testing of the Clean Sky 2 Distributed Electric Propulsion Scaled
Flight Demonstrator D08 DEP-SFD 537
Carsten Doll, Maurice Hoogreef, Pierluigi Iannelli, Henk Jentink, Daniel Kierbel

Author Index