

33rd AIAA Applied Aerodynamics Conference 2015

Held at the AIAA Aviation Forum 2015

**Dallas, Texas, USA
22-26 June 2015**

Volume 1 of 4

ISBN: 978-1-5108-0824-9

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 1801 Alexander Bell Drive, Reston, VA 20191, USA.

TABLE OF CONTENTS

VOLUME 1

AERODYNAMIC-STRUCTURE DYNAMICS INTERACTION

Aerodynamic Damping and Stiffness Determination for Aircraft Wing Flutter Speed Analysis (AIAA 2015-2250)	1
<i>Koon Yan Boo, Shuhaimi Mansor, Ainullofti Abdul-Latif</i>	
Experimental Investigation of the Aeroelastic Behavior a NACA0018 Cyber-Physical Flexible Wing (AIAA 2015-2251)	12
<i>Casey P. Fagley, Jurgen Seidel, Thomas E. McLaughlin</i>	
Spectral Formulation-Based FSI and Coupled Sensitivity Analysis for Dyanmic Aeroelastic Problems (AIAA 2015-2252)	25
<i>Seulgi Yi, Rachit Prasad, Seongim Choi, Dongkyun Im, Duckjoo Lee</i>	
Analyzing the Pitch Agility of an Ornithopter Undergoing Passive Compliant Element Induced Shape Change (AIAA 2015-2253)	37
<i>Zohaib Hasnain, James E. Hubbard, Joe Calogero, Mary Frecker, Aimy Wissa</i>	

AERODYNAMIC DESIGN METHODOLOGIES I

Development of NOVA Aircraft Configurations for Large Engine Integration Studies (AIAA 2015-2254)	58
<i>Ludovic Wiert, Olivier Atinault, Richard Grenon, Bernard Paluch, David Hue</i>	
Aircraft Directional Stability Prediction Method by CFD (AIAA 2015-2255)	88
<i>Pierluigi Della Vecchia, Fabrizio Nicolosi, Danilo Ciliberti</i>	
Design of a Multi-Stage Axial Turbine within the Scope of Complete System Design, Manufacturing and Operation of a New Turbine Propulsion Simulator (TPS) (AIAA 2015-2256)	100
<i>Alexander Krumme, Sinus Hegen, Ruben Nahuis</i>	
Fuselage Aerodynamic Prediction Methods (AIAA 2015-2257)	114
<i>Fabrizio Nicolosi, Pierluigi Della Vecchia, Danilo Ciliberti, Vincenzo Cusati, Lorenzo Attanasio</i>	
Investigation on Continuously Deflectable High-Lift Devices for a 3D High-lift Configuration (AIAA 2015-2258)	132
<i>Dirk M. Franke</i>	
Numerical Study of UAS-S4 Éhecatl Aerodynamic Performance Improvement Obtained with the Use of a Morphing Wing Approach (AIAA 2015-2259)	150
<i>Sugar Gabor Oliviu, Andreea Koreanschi, Ruxandra M. Botez</i>	

SPECIAL SESSION: LOW BOOM ACTIVITIES I

Under-Track CFD-Based Shape Optimization for a Low-Boom Demonstrator Concept (AIAA 2015-2260)	165
<i>Mathias Wintzer, Irian Ordaz, James W. Fenbert</i>	
Full-Carpet Design of a Low-Boom Demonstrator Concept (AIAA 2015-2261)	189
<i>Irian Ordaz, Mathias Wintzer, Sriram K. Rallabhandi</i>	
Numerical Simulations of Shock/Plume Interaction Using Structured Overset Grids (AIAA 2015-2262)	204
<i>Jeffrey A. Housman, Cetin C. Kiris</i>	
Cart3D Analysis of Plume and Shock Interaction Effects on Sonic Boom (AIAA 2015-2263)	223
<i>Raymond S. Castner</i>	

PROPELLER/ROTORCRAFT/WIND TURBINE AERODYNAMICS I

Experimental Evaluation of Open Propeller Aerodynamic Performance and Aero-acoustic Behavior (AIAA 2015-2264)	253
<i>Charles F. Wisniewski, Aaron R. Byerley, William Heiser, Kenneth W. Van Treuren, Trae Liller, Natalie Wisniewski</i>	
Slipstream Measurements of Small-Scale Propellers at Low Reynolds Numbers (AIAA 2015-2265)	267
<i>Robert W. Deters, Gavin K. Ananda, Michael S. Selig</i>	
The Influence of Airfoil Shape, Reynolds Number and Chord Length on Small Propeller Performance and Noise (AIAA 2015-2266)	292
<i>Charles F. Wisniewski, Aaron R. Byerley, William Heiser, Kenneth W. Van Treuren, Trae Liller</i>	
Designing Small Propellers for Optimum Efficiency and Low Noise Footprint (AIAA 2015-2267)	306
<i>Charles F. Wisniewski, Aaron R. Byerley, William Heiser, Kenneth W. Van Treuren, Trae Liller</i>	
A Parabolic Method for Accurate and Efficient Wind Farm Simulation (AIAA 2015-2268)	322
<i>Anshul Mittal, Kidambi Sreenivas, W. Roger Briley, Lafayette K. Taylor</i>	
Blade Resolved Simulation for a Wind Farm (AIAA 2015-2269)	331
<i>Walied E. Hassan, Kidambi Sreenivas, Anshul Mittal, Lafayette K. Taylor, Levi Hereth</i>	

APPLIED CFD & NUMERICAL CORRELATIONS WITH EXPERIMENTAL DATA I

Supersonic Projectile Steering using Micro-Actuators: Experimental and Numerical Study (AIAA 2015-2411)	340
<i>Michel Libsig, Bastien Martinez, Christian Rey, Thibaut Gauthier, Pierre Wey, Claude Berner, Yannick Bailly, Jean-Claude Roy</i>	
Effects of Tip Clearance on Miniature Gas Turbines Compressor Performance: A Numerical Approach (AIAA 2015-2412)	353
<i>Junting Xiang, Jorg U. Schluter, Fei Duan</i>	
Numerical Simulation of Water Spray Caused by a Rolling Airplane Tire (AIAA 2015-2413)	373
<i>Qiulin Qu, Fan Zhang, Peiqing Liu, Ramesh K. Agarwal</i>	

UNMANNED, BIO-INSPIRED, SOLAR POWERED AERIAL VEHICLE DESIGNS I

Computational Studies for the Development of a Hybrid UAV/UUV (AIAA 2015-2414)	383
<i>Ravi Ramamurti, Jason D. Geder, Dan Edwards, Trent Young</i>	
Force Production by Wing Flapping: The Role of Stroke Angle of Attack and Local Reynolds Number (AIAA 2015-2415)	397
<i>Alok A. Rege, Brian Dennis, Kamesh Subbarao</i>	
System Development for Wildfire SUAS (AIAA 2015-2416)	404
<i>Jamey D. Jacob, Dustin Gabbert, Mehran Andalibi</i>	

SPECIAL SESSION: AERODYNAMIC-STRUCTURAL MODELING, OPTIMIZATION, AND TEST TECHNIQUES FOR FLEXIBLE WING TECHNOLOGY I

Wind Tunnel Investigation of a Flexible Wing High-Lift Configuration with a Variable Camber Continuous Trailing Edge Flap Design (AIAA 2015-2417)	423
<i>Nhan T. Nguyen, Nathan Precup, Eli Livne, James M. Urnes, Eric Dickey, Chester Nelson, Jonathan Chiew, David L. Rodriguez, Eric Ting, Sonia Lebofsky</i>	
Use of a Viscous Flow Simulation Code for Static Aeroelastic Analysis of a Wing at High-Lift Conditions (AIAA 2015-2418)	453
<i>H. Dogus Akaydin, Shayan Moini-Yekta, Jeffrey A. Housman, Nhan T. Nguyen</i>	
Optimization of an Aeroservoelastic Wing with Distributed Multiple Control Surfaces (AIAA 2015-2419)	463
<i>Bret Stanford</i>	
Adaptive Aeroelastic Wing Shape Optimization for High-Lift Configurations (AIAA 2015-2420)	482
<i>Gustavo E. Fujiwara, Nhan T. Nguyen</i>	
Robust Optimization of Variable-Camber Continuous Trailing-Edge Flap System Action Using Stochastic Kriging (AIAA 2015-2421)	504
<i>Yan Liu, Junqiang Bai, Eli Livne</i>	
A 3-D Drag Optimization Study of Variable Camber Continuous Trailing Edge Flap (VCCTEF) Using OVERFLOW (AIAA 2015-2422)	525
<i>Upender K. Kaul, Nhan T. Nguyen</i>	

FLOW CONTROL APPLICATIONS & DEMONSTRATIONS (ACTIVE & PASSIVE) I

Study of Slanted Perforated Shapes in Tabs for Control of Subsonic Jets (AIAA 2015-2423)	537
<i>Asad Ahmed Reyaz Ahmed, S. Thanigaiarasu, S. Venkatraman, Srinivasan Elangovan, E. Rathakrishnan</i>	
Numerical Study of Internal Flow Structures in a Sweeping Jet Actuator (AIAA 2015-2424)	548
<i>Kursat Kara</i>	
Effect of Spanwise Jet Spacing on Separation Control for Swept and Unswept Airfoils (AIAA 2015-2425)	565
<i>Michael M. Walker, Kyle Hipp, Stuart I. Benton, Jeffrey P. Bons</i>	
Dynamic Flow Control over Aerodynamic Bodies using Phased Array Vectored Synthetic Jet Actuation (AIAA 2015-2426)	579
<i>Zohaib Hasnain, Lauren N. Trollinger, James E. Hubbard, Alison B. Flatau</i>	
Stochastic Analysis of Aerodynamic Forces Acting on a Self-adaptive Camber Airfoil in Turbulent Inflow (AIAA 2015-2427)	597
<i>Gerrit Kampers, Ulrike Cordes, Cameron D. Tropea, Michael Hoelling, Joachim Peinke</i>	

HIGH ANGLE OF ATTACK AND HIGH LIFT AERODYNAMICS

High Angle of Attack Flight of a Subscale Aerobatic Aircraft (AIAA 2015-2568)	604
<i>Or D. Dantsker, Michael S. Selig</i>	
Pressure Measurements of Burst Wakes Over a Three-Element Airfoil (AIAA 2015-2569)	621
<i>Brent W. Pomeroy, Michael S. Selig</i>	
Stall Maneuver Simulation of an Elastic Transport Aircraft based on Flight Test Data (AIAA 2015-2570)	636
<i>David Rohlmann, Stefan Keye</i>	
Numerical Investigation of the Dynamic Behavior of a High-Lift Configuration with Circulation Control (AIAA 2015-2571)	652
<i>Dennis Keller, Ralf Rudnik</i>	

Wall Modeled Large Eddy Simulation of the VFE-2 Delta Wing (AIAA 2015-2572)	669
<i>Christian Zwerger, Stefan Hickel, Christian Breitsamter, Nikolaus Adams</i>	

WIND TUNNEL AND FLIGHT TESTING

Analysis of Single Hole Simulated Battle Damage on a Wing Using Particle Image Velocimetry (AIAA 2015-2573)	683
<i>Mathew T. Almond, Peter Render, A. D. Walker</i>	
Windspeed and Flow Angle Measurement by Tracking of a Laser-Induced Breakdown Spark (AIAA 2015-2574)	698
<i>Mark R. Rennie, Minh Nguyen, Stanislav Gordeyev, Eric Jumper, Alan B. Cain, Timothy Hayden</i>	
Low Speed Wind Tunnel Investigation of a Circulation Control Wing for Enhanced Lift (AIAA 2015-2575)	709
<i>Konstantinos Kanistras, Pranith Chander Saka, Kimon P. Valavanis, Nikolaos I. Vitzilaos, Matthew J. Rutherford</i>	

VOLUME 2

Design of a Swept Wing Wind Tunnel Model for Study of Cross-flow Instability (AIAA 2015-2576)	726
<i>Jacopo Serpieri, Marios Kotsonis</i>	
Numerical Replication and Improvement of Wind Tunnel Tests for Design and Off-Design Operating Points of Wind Turbine Airfoils (AIAA 2015-2577)	741
<i>Timo Kuhn, Andree Altmikus, Nicholas Balaesque, Michael Lippert, Armin Fabbender</i>	
Development, Startup Operations and Tests of a Propeller Wind Tunnel Test Rig (AIAA 2015-2578)	763
<i>Sebastian Speck, Sebastian Herbst, Hyemin Kim, Franz-Georg Stein, Mirko Hornung</i>	
Study of the Flow Field Near the AOA Sensor of an A320 Aircraft (AIAA 2015-2579)	776
<i>Joseph Katz, Andy Luo</i>	

SPECIAL SESSION: LOW BOOM ACTIVITIES II

Feasibility of Supersonic Aircraft Concepts for Low-Boom and Flight Trim Constraints (AIAA 2015-2581)	787
<i>Wu Li</i>	
Uncertainty Analysis and Robust Design of Low-Boom Concepts using Atmospheric Adjoints (AIAA 2015-2582)	803
<i>Sriram K. Rallabhandi, Thomas K. West, Eric J. Nielsen</i>	
Rise Time Prediction of Sonic Boom by Full-Field Simulation with Thermal Nonequilibrium (AIAA 2015-2583)	824
<i>Rei Yamashita, Kojiro Suzuki</i>	
Free Flight Measurement of Aircraft Model using Aero Ballistic Range (AIAA 2015-2584)	837
<i>Akira Iwakawa, Daiki Furukawa, Yuma Aoki, Akihiro Sasoh</i>	

WEAPONS AERODYNAMICS: MISSILE/PROJECTILE/GUIDED-MUNITIONS, CARRIAGE AND STORE SEPARATION I

Flight Behaviors of a Complex Projectile using a Coupled CFD-based Simulation Technique: Free Motion (AIAA 2015-2585)	844
<i>Jubaraj Sahu, Frank Fresconi</i>	
Effect of Canard Deflection on Fin Performance of a Fin-Stabilized Projectile (AIAA 2015-2586)	872
<i>Sidra I. Siltan</i>	
Enhanced Body Vortex Modeling Within Missile Datcom (AIAA 2015-2587)	887
<i>Josh Doyle, Christopher C. Rosema</i>	
A Comparison of Predictive Methodologies for Missile Configurations with Strakes (AIAA 2015-2588)	929
<i>Christopher C. Rosema, Eric Abney, Shawn Westmoreland, Hayden Moore</i>	
Delayed Detached Eddy Simulation of Projectile Flows (AIAA 2015-2589)	986
<i>Jiaye Gan, Gecheng Zha</i>	

APPLIED CFD & NUMERICAL CORRELATIONS WITH EXPERIMENTAL DATA II

CFD Analysis of Counter-Rotating Open Rotors Using a Rotating Actuator Disk Model (AIAA 2015-2714)	1008
<i>Michael Malick, Ramesh K. Agarwal</i>	
Numerical Simulation of Compressible Flow in a Diffusing S-duct with and without Vortex Generators (AIAA 2015-2715)	1036
<i>Soudeh Kamali, Behzad Reza Ahrabi, Robert S. Webster, Kidambi Sreenivas</i>	
Massively Separated Turbulent Flow Simulation Around Non-rotating MEXICO Blade by Means of RANS and DDES Approaches in Openfoam (AIAA 2015-2716)	1057
<i>Ye Zhang, Alexander Van Zuijlen, Gerard Van Bussel</i>	
Wind Tunnel Wall Interference Effects on an Oscillating Aerofoil in the Stall Regime (AIAA 2015-2717)	1067
<i>Jie Cheng, Mark H. Lowenberg, Xiaoming Wang, Jiyan Yu</i>	

SPECIAL SESSION: HISTORICALLY SIGNIFICANT/INFLUENTIAL PAPERS IN APPLIED AERODYNAMICS

Origins and Further Development of the Jameson-Schmidt-Turkel Scheme (Invited) (AIAA 2015-2718)	1078
<i>Antony Jameson</i>	

SPECIAL SESSION: AERODYNAMIC-STRUCTURAL MODELING, OPTIMIZATION, AND TEST TECHNIQUES FOR FLEXIBLE WING TECHNOLOGY II

Ongoing Fixed Wing Research within the NASA Langley Aeroelasticity Branch (AIAA 2015-2719)	1119
<i>Robert E. Bartels, Pawel Chwalowski, Christie Funk, Jennifer Heeg, Jiyoung Hur, Mark D. Sanetrik, Robert C. Scott, Walter A. Silva, Bret Stanford, Carol D. Wieseman</i>	
Analysis of Limit Cycle Oscillation Data from the Aeroelastic Test of the SUGAR Truss-Braced Wing Model (AIAA 2015-2720)	1139
<i>Robert E. Bartels, Robert C. Scott, Christie Funk</i>	
Computational Aeroelastic Analyses of a Low-Boom Supersonic Configuration (AIAA 2015-2721)	1164
<i>Walter A. Silva, Mark D. Sanetrik, Pawel Chwalowski, Joseph Connolly</i>	
Unsteady Aeroservoelastic Modeling of Flexible Wing Generic Transport Aircraft with Variable Camber Continuous Trailing Edge Flap (AIAA 2015-2722)	1189
<i>Ezra A. Tal, Nhan T. Nguyen</i>	
Optimization for Load Alleviation of Truss-Braced Wing Aircraft With Variable Camber Continuous Trailing Edge Flap (AIAA 2015-2723)	1221
<i>Sonia Lebofsky, Eric Ting, Khanh V. Trinh, Nhan T. Nguyen</i>	
Measurement and Modeling of Aeroelastic Response under Gust (AIAA 2015-2724)	1235
<i>Yogesh Babbar, Vishvas S. Suryakumar, Thomas W. Strganac, Arun S. Mangalam</i>	

FLOW CONTROL APPLICATIONS & DEMONSTRATIONS (ACTIVE & PASSIVE) II

Simulation and Surrogate-Based Design of Rectangular Vortex Generators for Tiltrotor Aircraft Wings (AIAA 2015-2725)	1249
<i>Rhodri Bevan, Daniel J. Poole, Christian B. Allen, T. Rendall</i>	
Multipoint Design of Vortex Generators on a Swept Infinite-Wing under Cruise and Critical Condition (AIAA 2015-2726)	1267
<i>Nobuo Namura, Koji Shimoyama, Shigeru Obayashi</i>	
Flow Control in a Mach 4.0 Inlet by Slotted Wedge-shaped Vortex Generators (AIAA 2015-2727)	1281
<i>Deepak Varma, Siddharth Saurav, Santanu Ghosh</i>	
Wind Tunnel Experiments with Active Flow Control for an Outer Wing Model (AIAA 2015-2728)	1294
<i>Vlad Ciobaca, Jochen Wild, Matthias Bauer, Thomas Grund, Philipp Huehne, Peter Scholz, Bruno Stefes</i>	
Passive Flow Control Applied to a NACA23012 Airfoil In A Subsonic Flow (AIAA 2015-2729)	1306
<i>Nicholas Findanis</i>	
Computations of Active Open-Loop Flow Control on a Fluttering Wing (AIAA 2015-2730)	1321
<i>Jurgen Seidel, Casey P. Fagley, Thomas E. McLaughlin</i>	

SPECIAL SESSION: HYBRID CFP METHOD ASSESSMENTS FOR F-16XL AIRCRAFT AERODYNAMICS

Free-Flight High AoA Flows Simulation at Sub- and Transonic Speeds - F-16XL (CAWAPI-3) (AIAA 2015-2871)	1330
<i>Stephan M. Hitzel</i>	
F-16XL Hybrid Reynolds-Averaged Navier-Stokes/Large Eddy Simulation on Unstructured Grids (AIAA 2015-2872)	1353
<i>Michael A. Park, Alaa A. Elmiligui, Khaled S. Abdol-Hamid</i>	
Numerical Simulation of the F-16XL at Full-Scale Flight Test Conditions Using a Near-Body Off-Body CFD Approach (AIAA 2015-2873)	1390
<i>Scott A. Morton, David R. McDaniel</i>	
Hybrid RANS-LES Simulations of F-16XL Aircraft in Low-speed High-alpha Flight (AIAA 2015-2874)	1421
<i>Maximilian M. Tomac, Arthur W. Rizzi, Adam Jirasek</i>	

VOLUME 3

Numerical Simulation of the F-16XL at Full-Scale Flight Test Conditions Using Delayed Detached-Eddy Simulation (AIAA 2015-2875)	1430
<i>Andrew J. Lofthouse, Russell M. Cummings</i>	
A Synthesis of Hybrid CFD Results for F-16XL Aircraft Aerodynamics (AIAA 2015-2876)	1468
<i>James M. Luckring, Michael A. Park, Stephan M. Hitzel, Adam Jirasek, Andrew J. Lofthouse, Scott A. Morton, David R. McDaniel, Arthur Rizzi, Maximilian Tomac</i>	

AERODYNAMIC DESIGN METHODOLOGIES II

Improvements in the New Unsteady Far-Field Drag Breakdown Method and Application to Complex Cases (AIAA 2015-2877)	1498
<i>Hélène Toubin, Didier Bailly, Michel Costes</i>	
Aerodynamic Shape Optimization of BWB Aircraft Based on Multizone Collaborative Optimization Design Method (AIAA 2015-2878)	1519
<i>Zheng Hong Gao, Ke Zhao, Chao Wang</i>	
Design of A High-Performance Tailless MAV Through Planform Optimization (AIAA 2015-2879)	1532
<i>Murat Bronz, Gautier Hattenberger</i>	
Aerodynamic Optimization of Integrated Wing-Engine Geometry using an Unstructured Vorticity Solver (AIAA 2015-2880)	1540
<i>Logan King, Roy J. Hartfield, Vivek Ahuja</i>	

PROPELLER/ROTORCRAFT/WIND TURBINE AERODYNAMICS II

Development of UGS Monocopter: Platform Design and Trajectory Tracking (AIAA 2015-2881)	1575
<i>Sutthiphong Srigrarom, Muhammad N. Bin Abdul Malik</i>	
A Study of Separation on Airfoils Undergoing Pitch, Surge and Combined Motions (AIAA 2015-2882)	1592
<i>Reeve Dunne, Beverley J. McKeon</i>	
Computational Investigation of Coaxial Rotor Interactional Aerodynamics in Steady Forward Flight (AIAA 2015-2883)	1603
<i>Bradley J. Passe, Ananth Sridharan, James D. Baeder</i>	
Computational Investigations of Transient Loads and Blade Deformations on Coaxial Rotor Systems (AIAA 2015-2884)	1632
<i>Rajneesh Singh, Hao Kang</i>	
Rotor Dynamic Wake Inflow Modelling in State-Space Format (AIAA 2015-2885)	1643
<i>Massimo Gennaretti, Riccardo Gori, Jacopo Serafini, Giovanni Bernardini, Felice Cardito</i>	
Validation of Installation Effect Predictions through Simulations of Contra-Rotating Open Rotors at Low-Speed Flight Conditions (AIAA 2015-2886)	1659
<i>Arne W. Stuermer</i>	
A New Whirl Flutter Analysis Method (AIAA 2015-2887)	1678
<i>Youxu Yang, Guoning Huang, Dongqiang Zhao, Chu Tang</i>	

TRANSONIC & SUPERSONIC AERODYNAMICS

Numerical Study of Counterflowing Jet Effects on Supersonic Slender-Body Configurations (AIAA 2015-3010)	1691
<i>Balaji Shankar Venkatachari, Michael Mullane, Gary Cheng, Chau-Lyan Chang</i>	
Flow Physics of a Three-Dimensional Rounded Contour Bump in a Mach 1.3 Supersonic Free-stream (AIAA 2015-3011)	1713
<i>Kin Hing Lo, Konstantinos Kontis</i>	
Supersonic Air Flows Around Some Geometrical Primitives (AIAA 2015-3012)	1718
<i>Mikhail Kotov, Igor Kryukov, Larisa Ruleva, Sergey Solodovnikov, Sergey Surzhikov</i>	

VSTOL/STOL AERODYNAMICS

The LIFT! Project - Modular, Electric Vertical Lift System with Ground Power Tether (AIAA 2015-3013)	1738
<i>Michael J. Duffy, Anthony Samaritano</i>	
Numerical Investigation and Validation for Open Rotor Hover Performance (AIAA 2015-3014)	1758
<i>Qiuying Zhao, Chunhua Sheng</i>	

WEAPONS AERODYNAMICS: MISSILE/PROJECTILE/GUIDED-MUNITIONS, CARRIAGE AND STORE SEPARATION II

CFD Aerodynamic Characterization of a High Maneuverability Airframe (AIAA 2015-3015)	1773
<i>Craig J. Coyle, Sidra I. Siltan</i>	
Development and Validation of a RANS-based Airdrop Simulation Approach (AIAA 2015-3016)	1788
<i>Sven Geisbauer, Hauke Schmidt</i>	
Cavity-Store Interaction under Supersonic Freestream Conditions (AIAA 2015-3017)	1802
<i>Justin Merrick, Mark F. Reeder</i>	
Loads and Acoustics Prediction on Deployed Weapons Bay Doors (AIAA 2015-3018)	1815
<i>Essam F. Sheta, Robert E. Harris, Edward A. Luke, Benjamin George, Lawrence S. Ukeiley</i>	

APPLIED CFD & NUMERICAL CORRELATIONS WITH EXPERIMENTAL DATA III

Time-Accurate Unsteady Pressure Loads Simulated for the Space Launch System at Wind Tunnel Conditions (AIAA 2015-3149)	1833
<i>Stephen J. Alter, Greg J. Brauckmann, William L. Kleb, Craig Streett, Christopher Glass, David M. Schuster</i>	
Continuous Radial Jet in Annular Cross-flow (AIAA 2015-3150)	1861
<i>Pankaj Rajput, Iraj Kalkhoran</i>	
Simulation of a Flapping Wing UAV using a Coupled CFD-Control Tool (AIAA 2015-3151)	1877
<i>Jason D. Geder, Ravi Ramamurti, Kamal Viswanath</i>	
Output-Based Adaptive Meshing Applied to Space Launch System Booster Separation Analysis (AIAA 2015-3152)	1887
<i>Derek J. Dalle, Stuart E. Rogers</i>	
Improvement of CFD Results of NASA CRM by On-line Mesh Deformation Using Modal Analysis of a Wing (AIAA 2015-3153)	1913
<i>Petr Vrchota, Ales Prachar</i>	

UNMANNED, BIO-INSPIRED, SOLAR POWERED AERIAL VEHICLE DESIGNS II

Numerical Simulation of a Flapping Wing in Ansys-Fluent Based on the Fruit Fly Wing Kinematics (AIAA 2015-3155)	1938
<i>Brayant Nieto, Xiolesmy Alfonso, Karen Basto, Jaime Escobar</i>	
Aerodynamics of Southern Hawker Dragonfly: Aeshna cyanea (AIAA 2015-3156)	1953
<i>Sutthiphong Srigrarom, Chinnapat Thipyopas, Emmanuel Chia Tianyou, Kant Chaisiwan, Papangkorn Jessadavornwong, Park Chawapong, Saran Chaivathanaroj</i>	
Development and Analysis of Gull Inspired UAV Flapping Wing (AIAA 2015-3157)	1982
<i>David Kumar, Tigmanshu Goyal, Shyam K. Vemuri, P. M. Mohite, Sudhir Kamle</i>	
Development and Aero-structural Analysis of Light and Strong Carbon Fiber-CNT/PP Hummingbird Inspired MAV Wings (AIAA 2015-3158)	2003
<i>David Kumar, Deepak Pawar, Gurmeet Singh, P. M. Mohite, Sudhir Kamle</i>	

AIRFOIL/WING/CONFIGURATION AERODYNAMICS

Improved Stall Prediction for Swept Wings Using Low-Order Aerodynamics (AIAA 2015-3159)	2016
<i>Pranav Hosangadi, Ryan C. Paul, Ashok Gopalarathnam</i>	
Modeling and Prediction of the Crossflow Transition Using Transition Transport Equations (AIAA 2015-3160)	2033
<i>Jeonghwan Sa, Soo Hyung Park, Kum Won Cho, Kyoung Jin Jung</i>	
On the Resulting Aerodynamic Loss of Combinations of Localized Surface Roughness Patches on a Turbine Blade (AIAA 2015-3161)	2051
<i>Philipp Gilge, Karen Mulleners</i>	
Aero-Propulsive Coupling of an Embedded, Distributed Propulsion System (AIAA 2015-3162)	2064
<i>Mike F. Kerho</i>	
Aerodynamic Performance of the Adaptive Nacelle Inlet (AIAA 2015-3163)	2084
<i>Frane Majic, Guilla Efraimsson, Ciarán O'Reilly</i>	
Computational Assessment of Rainfall Effects on Aircraft Aerodynamic Characteristics (AIAA 2015-3164)	2096
<i>H. Sharma, S. Harshe, S. Vekaria, M. Singh, M. Damodaran, Boo Cheong Khoo</i>	

UNSTEADY AERODYNAMICS I

Measurements of Dynamic Interface Between Ship and Helicopter Air Wakes (AIAA 2015-3165)	2116
<i>Chen Friedman, Murray R. Snyder, Julie Duplessis</i>	
An Experimental Study of Added Mass on a Plunging Airfoil Oscillating with High Frequencies at High Angles of Attack (AIAA 2015-3166)	2134
<i>Mohamed Y. Zakaria, Daniel A. Pereira, Saad A. Ragab, Muhammad R. Hajj, Flávio D. Marques</i>	
Experimental-Based Unified Unsteady Nonlinear Aerodynamic Modeling For Two-Dimensional Airfoils (AIAA 2015-3167)	2142
<i>Mohamed Y. Zakaria, Haithem E. Taha, Muhammad R. Hajj, Ahmed A. Hussein</i>	

VOLUME 4

Experimental Dynamic Stall Study on a Low Reynolds Number Airfoil (AIAA 2015-3168)	2156
<i>Santiago Algozino, Julio Marañón Di Leo, Juan Delnero, Guillermo Capittini</i>	
Unsteady Aerodynamic Modeling of Rolling Parachutes Using the Indicial Method (AIAA 2015-3169)	2168
<i>Mehdi Ghoreyshy, Keith Bergeron, Jurgen Seidel, Andrew J. Lofthouse, Russell M. Cummings</i>	
Subsonic Indicial Aerodynamics for Unsteady Loads Calculation via Numerical and Analytical Methods: A Preliminary Assessment (AIAA 2015-3170)	2193
<i>Marcello Righi, Marco Berci, Jan Koch</i>	

Implementation of Vortex-type Gust Model Through Boundary Conditions (AIAA 2015-3171)	2219
<i>Elteyeb M. Eljack, Ibraheem M. Alqadi</i>	

INNOVATIVE AERODYNAMIC CONCEPTS & DESIGNS

Evaluation of Adaptive Compliant Trailing Edge Technology (AIAA 2015-3289)	2228
<i>Sean R. Wakayama, Ed V. White</i>	
Determination of Section Aerodynamic Operating Condition on Wings and Rotor Blades From Leading-Edge Pressure Measurements (AIAA 2015-3290)	2240
<i>Aditya Saini, Ashok Gopalathnam</i>	
Parametric Study of Box-Wing Aerodynamics for Minimum Drag Under Stability and Maneuverability Constraints (AIAA 2015-3291)	2255
<i>Stephen A. Andrews, Ruben E. Perez</i>	
Optimization of the Aerodynamic Performance of Regional and Wide-Body-Class Blended Wing-Body Aircraft (AIAA 2015-3292)	2268
<i>Thomas A. Reist, David W. Zingg</i>	
A Novel Aerodynamic Surface for Redirecting the Boundary Layer (AIAA 2015-3293)	2284
<i>Eiman B. Saheby, Guoping Huang, Wenyuan Qiao, Weiyuan Tang</i>	

LOW SPEED, LOW REYNOLDS NUMBER AERODYNAMICS

Numerical Investigation of Finite-aspect Ratio Plate Flows in Ground Effect (AIAA 2015-3294)	2301
<i>Albert Medina, Rajneesh Singh</i>	
Propulsion of a Plunging Flexible Airfoil using a Torsion Spring Model (AIAA 2015-3295)	2327
<i>Nipun Arora, Amit Gupta, Hikaru Aono, Wei Shyy</i>	
Blade Element Momentum Modeling of Low-Re Small UAS Electric Propulsion Systems (AIAA 2015-3296)	2350
<i>Matthew McCrink, James W. Gregory</i>	
Stereoscopic PIV Analysis on Rotary Plates in Bursting (AIAA 2015-3297)	2373
<i>Albert Medina, Anya R. Jones</i>	

VORTICAL/VORTEX FLOW

Near Ground Aircraft Wake Dissipation with Obstacles (AIAA 2015-3298)	2390
<i>Chung Hung J. Wang, Jorg U. Schluter</i>	
Effects of Spinning Motion on the Trapped Vortex Combustors (AIAA 2015-3299)	2402
<i>Song Chen, Randy Chue, Jorg U. Schluter, Simon Yu</i>	
Trailing Vortex-Induced Loads During Close Encounters in Cruise (AIAA 2015-3300)	2419
<i>Michael R. Mendenhall, Daniel J. Lesieutre, Michael J. Kelly</i>	
Simulating Aircraft Wake Vortices with OVERFLOW (AIAA 2015-3301)	2445
<i>Daniel G. Schauerhamer, Stephen K. Robinson</i>	
Investigation of Propeller Induced Ground Vortices by Numerical and Experimental Methods (AIAA 2015-3302)	2475
<i>Yannian Yang, Leo L. Veldhuis, Georg Eitelberg</i>	

UNSTEADY AERODYNAMICS II

Effect of Bending-Oscillations on a Streamwise-Oriented Vortex Interaction (AIAA 2015-3303)	2488
<i>Caleb J. Barnes, Miguel R. Visbal, George P. Huang</i>	
Complex Aero-engine Intake Ducts and Dynamic Distortion (AIAA 2015-3304)	2514
<i>David G. Macmanus, Nicola Chiereghin, Daniel Gil Prieto, Pavlos Zachos</i>	
Flow Distortion Measurements in Convolute Aero Engine Intakes (AIAA 2015-3305)	2542
<i>Pavlos Zachos, David G. Macmanus, Nicola Chiereghin</i>	
Large Eddy Simulations of Supersonic Jet Flows for Aeroacoustic Applications (AIAA 2015-3306)	2566
<i>Carlos Junqueira-Junior, Sami Yamouni, Joao Luiz F. Azevedo, William Wolf</i>	
Unsteady Aerodynamics Simulations of a Sedan-Type Road Vehicle during Sinusoidal Steering Input (AIAA 2015-3307)	2591
<i>Takuji Nakashima, Yousuke Morikawa, Makoto Tsubokura, Yoshirhiro Okada, Takahide Nouzawa</i>	
Coupled 6DoF motion and Aerodynamics Simulation of Road Vehicles in Crosswind gusts (AIAA 2015-3308)	2603
<i>Hirotsuka Ishioka, Keiji Onishi, Kosuke Nakasato, Takuji Nakashima, Makoto Tsubokura</i>	
An Unsteady Aerodynamic Model based on the Leading-Edge Stagnation Point (AIAA 2015-3309)	2614
<i>Vishvas S. Suryakumar, Yogesh Babbar, Thomas W. Strganac, Arun S. Mangalam</i>	

FLOW CONTROL APPLICATIONS & DEMONSTRATIONS (ACTIVE & PASSIVE) III

Nanosecond-SDBD Actuation over a Conical Forebody at Wind Speed 72 m/s and Angle of Attack 45 Degree (AIAA 2015-3310)	2635
<i>Jianlei Wang, Huaxing Li, Xuanshi Meng, Duo Zhang, Feng Liu, Shijun Luo</i>	

Computational Evaluation of Flow Control for Enhanced Control Authority of a Vertical Tail (AIAA 2015-3311)	2645
<i>Arvin Shmilovich, Yoram Yadlin, Edward A. Whalen</i>	
Techniques for the Design of Active Flow Control Systems in Heavy Vehicles (AIAA 2015-3312)	2659
<i>David E. Manosalvas, Thomas D. Economon, Francisco Palacios, Antony Jameson</i>	
Experimental Investigation of Passive Load Reduction Under Dynamic Inflow Conditions (AIAA 2015-3313)	2672
<i>Ulrike Cordes, Klaus Hufnagel, Cameron D. Tropea, Gerrit Kampers, Michael Hölling, Joachim Peinke</i>	
Plenum Design for Compact Fluidic Effectors (AIAA 2015-3314)	2684
<i>James Chard, Alberto Llopis-Pascual, William Crowther</i>	

ICING OR ROUGHNESS EFFECTS ON VEHICLE AERODYNAMICS

Data-Driven Low-Dimensional Modeling and Uncertainty Quantification for Airfoil Icing (AIAA 2015-3383)	2698
<i>Anthony Degennaro, Clarence W. Rowley, Luigi Martinelli</i>	
Aerodynamic Effects of Roughness on Wind Turbine Blade Sections (AIAA 2015-3384)	2714
<i>Liselle A. Joseph, Julien Fenouil, Aurelien Borgoltz, William J. Devenport, Aurelien Borgoltz</i>	
The Characteristics of SLD Icing Accretions and Aerodynamic Effects on High-lift Configurations (AIAA 2015-3385)	2733
<i>Chen Zhang, Fuxin Wang, Weiliang Kong, Hong Liu</i>	

AERODYNAMIC DESIGN METHODOLOGIES III

Experimental Validation of an Optimized Wing Geometry Using Small Wind Tunnel Testing (AIAA 2015-3386)	2744
<i>Andreea Koreanschi, Oliviu Sugar-Gabor, Ruxandra M. Botez</i>	
Stability Derivative Computation of Tailless Aircraft using Variable-Fidelity Aerodynamic Analysis (AIAA 2015-3387)	2777
<i>Jangho Park, Christopher L. Ocheltree, Jae Young Choi, Seongim Choi, Alex Friedman, Yeongmin Jo</i>	
Aerodynamic Performance Study of High Pressure Zone Capture Wing Configurations (AIAA 2015-3388)	2793
<i>Kai Cui, Guangli Li, Yao Xiao</i>	

PROPELLER/ROTORCRAFT/WIND TURBINE AERODYNAMICS III

Sensitivity of Wind Turbine Airfoil Sections to Geometry Variations Inherent in Modular Blades (AIAA 2015-3389)	2806
<i>Kenneth A. Brown, Nick Molinaro, Timothy W. Meyers, Aurelien Borgoltz, William J. Devenport, Jonathan Luedke, David Pesetsky</i>	
Configuration and Numerical Investigation of the Adaptive Camber Airfoil as Passive Load Alleviation Mechanism for Wind Turbines (AIAA 2015-3390)	2832
<i>David Marten, Henning Spiegelberg, Georgios Pechlivanoglou, C. Nayeri, Christian O. Paschereit, Cameron D. Tropea</i>	
Extension of a Parabolic Method without Pressure Approximations for Wind Turbines in ABL Flows (AIAA 2015-3391)	2841
<i>Anshul Mittal, Lafayette K. Taylor, Kidambi Sreenivas, W. Roger Briley, D. Stephen Nichols</i>	
Experimental and Numerical Investigations of a Small Research Wind Turbine (AIAA 2015-3392)	2849
<i>Stefan Vey, David Marten, Georgios Pechlivanoglou, C. Nayeri, Christian O. Paschereit</i>	
Optimization of Wind Turbine Airfoils Subject to Particle Erosion (AIAA 2015-3393)	2858
<i>Giovanni Fiore, Michael S. Selig</i>	
Author Index	