

34th AIAA Applied Aerodynamics Conference 2016

Held at the AIAA Aviation Forum 2016

Washington, D.C., USA
13 - 17 June 2016

Volume 1 of 4

ISBN: 978-1-5108-2742-4

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

VOLUME 1

APA-01: FLOW CONTROL APPLICATIONS AND DEMONSTRATIONS I

A Method of Reducing the Drag of Transport Wings (AIAA 2016-3115)	1
<i>James E. Alderman, Stephen Rolston, Michael Gaster, Christopher J. Atkin</i>	
CROR-Powerplant Pylon Wake Mitigation for Noise Reduction Through Innovative Blowing/suction-based Active Flow Control System (AIAA 2016-3116)	9
<i>Yannick Bury, Alban Bordron, Hervé Belloc, Damien Prat</i>	
Investigation of the Discrete Effects of Suction in Large Scale Arrays for Laminar Flow Control (AIAA 2016-3117)	22
<i>Barry J. Crowley, Christopher J. Atkin</i>	
Wingtip Vortex Modifications Using Alternating Jets (AIAA 2016-3118)	32
<i>Richard Kranepuhl, Sergey V. Shkarayev, Pascal Planchenault</i>	
Aerodynamics of Wing with Oscillating Wingtip Flapper (AIAA 2016-3119)	56
<i>Sergey V. Shkarayev, Erlong Su, Longfei Zhao</i>	
The Role of Spanwise Flow for Swept Wing Separation Control with Varied Spanwise Jet Spacing (AIAA 2016-3120)	83
<i>Michael M. Walker, Kyle Hipp, Jeffrey P. Bons</i>	

APA-02: RESULTS FROM THE 2ND AIAA AEROELASTIC PREDICTION WORKSHOP I

Overview and Data Comparisons of the Second Aeroelastic Prediction Workshop (AIAA 2016-3121)	102
<i>Jennifer Heeg, Pawel Chwalowski, Carol D. Wieseman</i>	
FUN3D Analyses in Support of the Second Aeroelastic Prediction Workshop (AIAA 2016-3122)	134
<i>Pawel Chwalowski, Jennifer Heeg</i>	
A Comparison of CFD and AIC-Based Methods for Unsteady Aerodynamics and Flutter Computations of the AePW-2 Wing Model (AIAA 2016-3123)	153
<i>Guilherme R. Begnini, Cleber Spode, Aluisio V. Pantaleao, Bruno Guaraldo Neto, Guilherme D. Marcório, Marcos H. Pedras, Carlos A. Bones</i>	
Flow Simulations for the Second Aeroelastic Prediction Workshop Using the EZNSS Code (AIAA 2016-3124)	171
<i>Daniella E. Raveh, Yair Mor Yossef, Yuval Levy</i>	

APA-03: PROPELLER/ROTORCRAFT/WIND TURBINE AERODYNAMICS I

Transient CFD Analysis of Three Dimensional Dynamic Stall on 5 MW NREL Wind Turbine Baseline Rotor (AIAA 2016-3126)	205
<i>Nisar Fatima, K.V.N Gopal</i>	
DDES and URANS Comparison of the NREL Phase-VI Wind Turbine at Deep Stall (AIAA 2016-3127)	215
<i>Hamid Rahimi, Bastian Dose, Ivan Herraes, Joachim Peinke, Bernhard Stoevesandt</i>	
An Experimental Study on the Wake Characteristics of Dual-Rotor Wind Turbines by Using a Stereoscopic PIV Technique (AIAA 2016-3128)	229
<i>Hui Hu, Wei Tian, Zhenyu Wang</i>	
A Comparative Assessment of Correlation-based Transition Models for Wind Power Applications (AIAA 2016-3129)	246
<i>David A. Corson, Alonso Zamora, Shivaji Medida</i>	

APA-04: APPLIED CFD & NUMERICAL CORRELATIONS WITH EXPERIMENTAL DATA I

Application of Strand Grid Framework to Complex Rotorcraft Simulations (AIAA 2016-3130)	272
<i>Vinod K. Lakshminarayan, Jayanarayanan Sitaraman, Andrew M. Wissink</i>	
Effect of Fuselage and Wind Tunnel Wall on Full-Scale UH-60A Rotor Tip Vortex Prediction (AIAA 2016-3131)	294
<i>Buvaneshwari Jayaraman, Mark Potsdam</i>	

Computational Study of a Lifting Surface in Propeller Slipstreams (AIAA 2016-3132)	309
<i>Sparsh A. Chadha, Brent W. Pomeroy, Michael S. Selig</i>	

APA-07: FLOW CONTROL APPLICATIONS AND DEMONSTRATIONS II

Numerical Study of a Double Stream Jet: ZDES Simulation, Stability Analysis and Noise Reduction (AIAA 2016-3259)	328
<i>Fulvio Sartor, Fabien Gand, Maxime Huet, Samir Beneddine, Denis Sipp</i>	
Reynolds Number Effect of Leading Edge Tubercles on Airfoil Aerodynamics (AIAA 2016-3260)	348
<i>Luke H. Peristy, Ruben E. Perez, Asad Asghar, William D. Allan</i>	
Numerical Simulation of a Sweeping Jet Actuator (AIAA 2016-3261)	368
<i>Kursat Kara</i>	
Flow Control and Analysis on Simplified Ship Helideck (AIAA 2016-3262)	387
<i>Quentin Gallas, Murielle Lamoureux, Jean-Claude Monnier, Anne Gilliot, Christophe Verbeke, Jérôme Delva</i>	
Effects of Geometric Parameters on Performance of Sweeping Jet Actuator (AIAA 2016-3263)	401
<i>Bartosz Z. Slupski, Kursat Kara</i>	

APA-08: RESULTS FROM THE 2ND AIAA AEROELASTIC PREDICTION WORKSHOP II

RANS-LES Hybrid Turbulence Modelling for Aeroelastic Problems: Test Case 3 in the Second AIAA Aeroelastic Prediction Workshop (AIAA 2016-3264)	414
<i>Marcello Righi</i>	
An Immersed Boundary Method for Solving the Compressible Navier-Stokes Equations with Fluid-Structure Interaction (AIAA 2016-3265)	429
<i>Christoph Brehm, Michael F. Barad, Cetin C. Kiris</i>	

APA-09: APPLIED CFD & NUMERICAL CORRELATIONS WITH EXPERIMENTAL DATA II

Assessment of an Inviscid Euler-Adjoint Solver for Prediction of Aerodynamic Characteristics of the NASA HL-20 Lifting Body (AIAA 2016-3266)	454
<i>Dan Almosnino</i>	
A Low Subsonic Study of the NASA N2A Hybrid Wing-Body Using an Inviscid Euler-Adjoint Solver (AIAA 2016-3267)	475
<i>Dan Almosnino</i>	
Aerodynamic Interactions between Landing-Gear Components (AIAA 2016-3268)	493
<i>Stefano Spagnolo, Xin Zhang, Zhiwei Hu, David Angland</i>	
DDES Simulation of a Complex Main Landing Gear with Six-Wheel Bogie (AIAA 2016-3269)	509
<i>Utsav Oza, Zhiwei Hu, Xin Zhang, David Angland</i>	
Numerical Assessment for PIV Measurement in Airplane Wakes (AIAA 2016-3270)	531
<i>Kisa Matsushima, Hiroyuki Kato</i>	

APA-10: VSTOL/STOL APPLICATIONS

Aerodynamic Analysis for Conceptual Design of a Lift-Fan type Aircraft (AIAA 2016-3408)	544
<i>Hoogyoung Lee, Rachit Prasad, Seongim Choi</i>	
Numerical Investigations of Fan-In-Wing Aerodynamic Performance with Active Flow Control (AIAA 2016-3409)	558
<i>Chunhua Sheng, Qiuying Zhao</i>	
Experimental Verification of a Semi-Empirical V/STOL Aircraft Performance Analysis Method (AIAA 2016-3410)	574
<i>Murat Bronz, Antoine Drouin</i>	
Unsteady Velocity Measurements of Supersonic Military-Style Exhaust Jets in Practical Configurations (AIAA 2016-3411)	585
<i>Scott Hromisin, Russell W. Powers, Leighton M. Myers, Dennis K. McLaughlin</i>	
UC2AV: Unmanned Circulation Control Aerial Vehicle for Short Takeoff and Enhanced Payload (AIAA 2016-3412)	606
<i>Konstantinos Kanistras, Pranith Chander Saka, Kimon P. Valavanis, Matthew J. Rutherford</i>	

APA-11: AERODYNAMIC – STRUCTURAL MODELING, OPTIMIZATION, AND TEST TECHNIQUES FOR FLEXIBLE WING TECHNOLOGY I

Wing Shaping Concept for Distributed Propulsion Aircraft to Improve Aerodynamic Efficiency (AIAA 2016-3413) 619
Nhan T. Nguyen, Kevin W. Reynolds, Eric Ting, Natalia Nguyen

A Study on VGTM Actuation System for Multi Axis Morphing Wing of UAV (AIAA 2016-3414) 662
Palaniswamy Shanmugam, Samikkannu Raja, K. M. Parammasivam, Fathima Zohra

Comparison of Curvilinear Stiffeners and Tow Steered Composites for Aeroelastic Tailoring of Transports (AIAA 2016-3415) 673
Bret Stanford, Christine Jutte

VOLUME 2

Aerodynamic Characteristics and Shape Optimization of a Variable Camber Compliant Wing (AIAA 2016-3416) 689
Youngmin Jo, Seongim Choi, Lauren Zientarski, James J. Joo

A Status Review of the Commercial Supersonic Technology (CST) Aeroservoelasticity (ASE) Project (AIAA 2016-3417) 708
Walter A. Silva, Mark D. Sanetrik, Pawel Chwalowski, Christie J. Funk, Donald F. Keller, Ulf Ringertz

Aerodynamic Modeling of Transonic Aircraft Using Vortex Lattice Coupled with Transonic Small Disturbance for Conceptual Design (AIAA 2016-3418) 735
Daniel Chaparro, Gustavo E. Fujiwara, Eric Ting, Nhan T. Nguyen

APA-12: PROPELLER/ROTORCRAFT/WIND TURBINE AERODYNAMICS II

Aeromechanics Analysis of a Coaxial Rotor System in Hover and High-Advance-Ratio Forward Flight (AIAA 2016-3419) 750
Roland Feil, Juergen Rauleder, Manfred Hajek

Investigation of Centrifugal Pumping Rotor Blades in Hover Using CFD (AIAA 2016-3420) 769
Stefan Platzer, Juergen Rauleder, Manfred Hajek

Pusher-Propeller Blade Loading With and Without Pylon Trailing-Edge Blowing (AIAA 2016-3421) 785
Tomas Sinnige, Daniele Ragni, Georg Eitelberg, Leo L. Veldhuis

A More Comprehensive Database for Low Reynolds Number Propeller Performance Validations (AIAA 2016-3422) 796
Armin Ghoddoussi, Leonard S. Miller

Effect of Reynolds Numbers of 10,000 to 100,000 on Rotor Blades of Small Unmanned Aerial Vehicles (AIAA 2016-3423) 808
Hikaru Otsuka, Keiji Nagatani

APA-13: HYPERSONIC AERODYNAMICS

Numerical Analysis of a Separated Flow on a Supersonic Cone Flare Model (AIAA 2016-3424) 820
Olivier Frayssinet, Jacques Castagnos, Jean-Paul Claudel

Euler Model of Mass Loss in the Process of Hypersonic Solid Particle Impact (AIAA 2016-3426) 834
Hao Dai, Chunling Zhu, Huanyu Zhao, Zhengzhi Wang

Numerical Simulation of Time-Varying Plasma Sheath for Reentry Vehicle (AIAA 2016-3428) 843
Chun Shao, Deyang Tian, Weifang Chen

APA-14: TRANSONIC & SUPERSONIC AERODYNAMICS

A Novel Mid-field Breakdown of the Aerodynamic Force in Compressible Flows (AIAA 2016-3429) 854
Mario Ostieri, Renato Tognaccini, Benedetto Mele

An Investigation of C-130 Aircraft Base Drag Reduction with Aftbody Modifications (AIAA 2016-3430) 876
Hakan Telli, Erdem Ayan, Suleyman Soyer, Erdem Gülsever, Selman Özcan

Development of Deformed CAD Geometries of NASA's Common Research Model for the Sixth AIAA CFD Drag Prediction Workshop (AIAA 2016-3431)	890
<i>Stefan Keye, Mark Gammon</i>	
Shape Optimization of Supersonic Bodies to Reduce Sonic Boom Signature (AIAA 2016-3432)	897
<i>Junhui Li, Tim Wray, Ramesh K. Agarwal</i>	
CFD Performance of Turbulence Models for Flow from Supersonic Nozzle Exhausts (AIAA 2016-3433)	913
<i>Hanju Lee, Tim Wray, Ramesh K. Agarwal</i>	

APA-16/FD-21: FLAPPING FLIGHT AERODYNAMICS

Numerical Simulation of a Flapping Wing Mav Based on Wing Deformation Capture Analysis (AIAA 2016-3552)	926
<i>Wee Beng Tay, J.H.S. de Baar, Mustafa Percin, Shuanghou Deng, Bas W. van Oudheusden</i>	
Computational Study of Three-Dimensional Rigid Flapping Wings with Unequal Pitch/Plunge Frequency (AIAA 2016-3553)	939
<i>Namhun Lee, Minsoo Kim, Seungsoo Lee, Haeseong Cho, SangJoon Shin</i>	
Lift and Drag of Flapping Membrane Wings at High Angles of Attack (AIAA 2016-3554)	951
<i>Mohamed Y. Zakaria, David W. Allen, Craig A. Woolsey, Muhammad R. Hajj</i>	
Low Order Modeling of Flow Features and Aerodynamic Forces in Flapping Airfoils (AIAA 2016-3555)	964
<i>Marco Raiola, Stefano Discetti, Andrea Ianiro</i>	
Thrust Generation in Heaving and Flapping Wings in Forward Flight (AIAA 2016-3556)	974
<i>Gonzalo Arranz, Oscar Flores</i>	
CFD-Coupled Trim Analysis of a Millimeter-Scale Flapping Wing MAV in Steady Turning Flight (AIAA 2016-3557)	985
<i>Camli Badrya, Ananth Sridharan, James D. Baeder</i>	
Investigation Into Reynolds Number Effects on a Biomimetic Flapping Wing (AIAA 2016-3558)	1004
<i>Daniel Hope, Anthony Deluca, Ryan O'Hara</i>	

APA-17: INLET/INTAKE AERODYNAMICS

Influence of Near-leading Edge Curvature on the Performance of Aero-Engine Intake Lips at High-Incidence (AIAA 2016-3559)	1020
<i>Andrea Coschignano, Holger Babinsky, C. Sheaf, E. Platt</i>	
Convolved Intake Distortion Measurements Using Stereo Particle Image Velocimetry (AIAA 2016-3560)	1033
<i>Daniel Gil-Prieto, Pavlos Zachos, David G. MacManus, Geoffrey Tanguy, Kevin R. Menzies</i>	
Pressure Flow Field and Inlet Flow Distortion Metrics Reconstruction from Velocity Data (AIAA 2016-3561)	1057
<i>Michele Frascella, Pavlos Zachos, Daniel Gil-Prieto, David G. MacManus</i>	
Dynamic Flow Distortion Investigation in an S-duct using DDES and SPIV Data (AIAA 2016-3562)	1077
<i>Daniel Gil-Prieto, David G. MacManus, Pavlos Zachos, Geoffrey Tanguy, François Wilson, Nicola Chiereghin</i>	
Passive Flow Control Study in a Convolved Intake Using Stereo Particle Image Velocimetry (AIAA 2016-3563)	1098
<i>Geoffrey Tanguy, Pavlos Zachos, David G. MacManus, Daniel Gil-Prieto, Eric Garnier</i>	
Numerical Investigation of Bleed Effects on Supersonic Inlet under Various Bleed and Inlet Conditions (AIAA 2016-3564)	1121
<i>Yohan Choe, Chongam Kim</i>	

APA-18: HISTORICALLY SIGNIFICANT/INFLUENTIAL PAPERS IN APPLIED AERODYNAMICS

Selected Scientific and Technical Contributions of Edward C. Polhamus (AIAA 2016-3565)	1134
<i>James M. Luckring</i>	

APA-19: AERODYNAMIC – STRUCTURAL MODELING, OPTIMIZATION, AND TEST TECHNIQUES FOR FLEXIBLE WING TECHNOLOGY II

Real-Time Adaptive Least-Squares Drag Minimization for Performance Adaptive Aeroelastic Wing (AIAA 2016-3567) 1164
Yvonne Ferrier, Nhan T. Nguyen, Eric Ting

An Integral Boundary Layer Direct Method Applied to 2D Transonic Small-Disturbance Equations (AIAA 2016-3568) 1197
Gustavo E. Fujiwara, Daniel Chaparro, Nhan T. Nguyen

Lift Optimization Study of a Multi-Element Three-Segment Variable Camber Airfoil (AIAA 2016-3569) 1208
Upendar K. Kaul, Nhan T. Nguyen

Roll Control Evaluation of the X-56A Flying Wing Aircraft Using Active Camber Control compared to Conventional Ailerons using Vortex Lattice Theory (AIAA 2016-3570) 1230
Eric T. Yerly, Anthony Deluca, James J. Joo

Static Aeroelastic Model Assessment in the Transonic Regime (AIAA 2016-3571) 1249
Marie F. Denison, Eric Ting, Jeffrey A. Housman, Nhan T. Nguyen

APA-20: APPLIED CFD & NUMERICAL CORRELATIONS WITH EXPERIMENTAL DATA III

Transition Transport Modeling for the Prediction of Crossflow Transition (AIAA 2016-3572) 1263
Cornelia Grabe, Nie Shengyang, Andreas Krumbein

Evaluation of Six Turbulence Models for Accurate Numerical Simulation of 2D Slot Nozzle Ejector (AIAA 2016-3573) 1290
Isaac Witte, Colin Graham, Ramesh K. Agarwal, Tim Wray

Comparison of Uncoupled and Coupled CFD-based Simulation Techniques for the Prediction of the Aerodynamic Behavior of a Complex Projectile (AIAA 2016-3574) 1321
Sidra I. Siltan, Jubaraj Sahu, Frank Fresconi

A Numerical Method for Transonic Wind Tunnel Wall Interference Correction in Airfoil Testing (AIAA 2016-3575) 1344
Boping Ma, Gang Wang, Zhengyin Ye, Lincheng Xu

Numerical Simulation of Supersonic Jets in Transonic and Supersonic Crossflows Using Kestrel (AIAA 2016-3576) 1357
Lars Johnsen, Christopher L. Martin, Mark F. Reeder, Darrell S. Crowe

Hypersonic Experimental Aero-thermal Capability Study through Multilevel Fidelity Computational Fluid Dynamics (AIAA 2016-3577) 1370
Denton G. Sagerman, James Tancred, Markus Rumpfkeil, Barry M. Hellman

VOLUME 3

Numerical Prediction of Longitudinal Dynamic Stability for a Lifting Body in Transonic Flow (AIAA 2016-3578) 1411
Bodo Reimann

APA-21: HIGH ANGLE OF ATTACK AND HIGH LIFT AERODYNAMICS

Analysis of Low-Speed Stall Aerodynamics of a Swept Wing with Seamless Flaps (AIAA 2016-3720) 1421
Trong T. Bui

Lattice-Boltzmann Simulations of the JAXA JSM High-Lift Model (AIAA 2016-3721) 1430
Benedikt König, Ehab Fares, Mitsuhiro Murayama, Yasushi Ito, Yuzuru Yokokawa, Kazuomi Yamamoto, Kazu Ishikawa

Numerical Study of Aerodynamics and Flow Physics of the 30P30N Three-Element Airfoil in Dynamic Ground Effect (AIAA 2016-3722) 1446
Qiulin Qu, Liewei Huang, Peiqing Liu, Wei Wang, Ramesh K. Agarwal

APA-22: GROUND VEHICLE AERODYNAMICS

Forcing Boundary-Layer Transition on an Inverted Airfoil in Ground Effect at Varying Incidence (AIAA 2016-3724)	1459
<i>Luke S. Roberts, Mark Finnis, Kevin Knowles, N. J. Lawson</i>	
Wake Deceleration of a Racecar Multielement Airfoil in Ground Effect (AIAA 2016-3725)	1473
<i>Suraj Bansal, Michael S. Selig</i>	
Aerodynamics Simulation of a Sedan-type Road Vehicle in Cornering Motion with Roll Angle (AIAA 2016-3726)	1500
<i>Ryosuke Kono, Takuji Nakashima, Makoto Tsubokura, Yoshihiro Okada, Takahide Nouzawa</i>	
Dynamic Mode Decomposition of Flow Around a Full-Scale Road Vehicle Using Unsteady CFD (AIAA 2016-3727)	1510
<i>Jun Ikeda, Daiki Matsumoto, Makoto Tsubokura, Masanori Uchida, Takumi Hasegawa, Ryuya Kobayashi</i>	

APA-23/FD-28: PROPELLER/ROTORCRAFT/WIND TURBINE AERODYNAMICS III

Towards the Optimization of Wind Turbine Rotor Blades by Means of Computational Fluid Dynamics and the Adjoint Approach (AIAA 2016-3728)	1523
<i>Lena Vorspel, Bernhard Stoevesandt, Joachim Peinke, Ivan Herraes</i>	
Development of Real-time System-wide Safety Assurance Definitions and Concept Fundamentals (AIAA 2016-3729)	1533
<i>David Rinehart, Hernando Jimenez, Matthew Blake, Jessica Nowinski</i>	
Vestas V136 Rotor: Outer-Blade-Region Airfoil Design and Wind Tunnel Testing (AIAA 2016-3730)	1545
<i>Francesco Grasso</i>	
Numerical Investigation of Self-Starting Capability of Vertical-Axis Wind Turbines at Low Reynolds Numbers (AIAA 2016-3731)	1554
<i>Hsieh-Chen Tsai, Tim Colonius</i>	
Effects of Leading-Edge Structures on Stall Behaviors of a NACA0015 Airfoil: A Multi-plane PIV Study (AIAA 2016-3732)	1566
<i>Yan Zhang, Jordi Esteveordal, Sadhana Bhusal, Jessin Krech</i>	

APA-25/FD-38: AERODYNAMIC DESIGN METHODOLOGIES I

Data-Driven Probabilistic Boundary Layer Modeling for Airfoil Performance Prediction (AIAA 2016-3864)	1580
<i>Alexandre N. Marques, Qiqi Wang, Youssef M. Marzouk</i>	
Aerodynamic Shape Optimization by Variable-fidelity Models and Gradient-Enhanced Manifold Mapping (AIAA 2016-3865)	1604
<i>Leifur T. Leifsson, Yonatan Afework Tesfahunegn, Slawomir Koziel</i>	
A Locally Adaptive Subdivision Parameterisation Scheme for Aerodynamic Shape Optimisation (AIAA 2016-3866)	1611
<i>Dominic A. Masters, Nigel J. Taylor, T. Rendall, Christian B. Allen</i>	
Development of An Efficient Three-Dimensional Tightly Coupled Euler/Potential Solver for Transonic Flow Analysis (AIAA 2016-3867)	1632
<i>Youngmin Jo, Se Hwan Park, Duck-Joo Lee, Seongim Choi</i>	
Three Dimensional Design Optimization Using Adjoint Method (AIAA 2016-3868)	1646
<i>Ali Yildirim, Sinan Eyi</i>	
A New Formulation of Gradient-Enhanced Surrogate Model and Application to Aerodynamic Design (AIAA 2016-3869)	1663
<i>Chenxing Song, Zhonghua Han, Yu Zhang</i>	
Optimization of Flap Position using a Modified Discrete Vortex Method (AIAA 2016-3870)	1691
<i>Narayanarao Balakrishnan, Partha Mondal, Anup V. Kanale, Nikhil V. Shende, Rohan P. Wadnerkar</i>	

APA-26: AERODYNAMIC – STRUCTURAL DYNAMICS INTERACTIONS I

Development of a Fluid-Structure Interaction Framework Using Unstructured Cartesian CFD Methods (AIAA 2016-3871)	1704
<i>Matthew S. Bopp, Stephen M. Ruffin</i>	

Understanding Energy Transfer in Aeroelastic Flutter (AIAA 2016-3872)	1728
<i>Prachi D. Deshpande, Atul Kelkar</i>	
A Reduced Order Model for Aeroelastic Response Prediction to Continuous Turbulence Encounter including CFD Aerodynamics (AIAA 2016-3873)	1740
<i>David Quero-Martin, Wolf Krüger, Guillermo Jenaro</i>	

APA-27: INNOVATIVE AERODYNAMIC CONCEPTS & DESIGNS

Aerodynamic Design of Blended Wing-Body and Lifting-Fuselage Aircraft (AIAA 2016-3874)	1762
<i>Thomas A. Reist, David W. Zingg</i>	
Aerodynamic Design of the Hybrid Wing Body with Nacelle: N3-X Propulsion-Airframe Configuration (AIAA 2016-3875)	1786
<i>May-Fun Liou, David Gronstal, Hyoung Jin Kim, Meng-Sing Liou, David Harding</i>	
Design and Analyses of High Aspect Ratio Nozzles for Distributed Propulsion Acoustic Measurements (AIAA 2016-3876)	1804
<i>Vance F. Dippold</i>	
Virtual Flight Demonstration of the Stratospheric Dual-Aircraft Platform (AIAA 2016-3877)	1830
<i>William A. Engblom, Ryan K. Decker</i>	
Parameter Study of Low Noise CROR System (AIAA 2016-3878)	1846
<i>Seulgi Yi, Hyung-Il Kwon, Dongkyun Im, Seongim Choi, Minjun Park, Duck-Joo Lee</i>	
Wing-In-Ground-Effect Craft as a Potential Domestic Transport Vehicle (AIAA 2016-3879)	1862
<i>Surjatin Wiradidjaja, Zahratu H. Mohamad, Azmin Shakrine Mohd Rafie, Mohammed Elhadi, Apu Fariduzzaman, Fadilah Hasim</i>	

APA-28: AERODYNAMIC TESTING: FLIGHT, WIND-TUNNEL AND FLIGHT TESTING

Experimental Visualization of Junction Separation Bubbles at Low- to Moderate-Reynolds Numbers (AIAA 2016-3880)	1873
<i>Matthew S. Kuester, Aurelien Borgoltz, William J. Devenport</i>	
Investigation of the Aerodynamic Characteristics of a Lifting Body in Ground Proximity (AIAA 2016-3881)	1890
<i>Jenny C. Holt, Kevin P. Garry, Tony Smith</i>	
Wind Tunnel Test of Subscale Ringsail and Disk-Gap-Band Parachutes (AIAA 2016-3882)	1900
<i>Carlie Zumwalt, Juan Cruz, Clara O'Farrell, Donald Keller</i>	
Aerodynamic Models for the Low Density Supersonic Decelerator (LDSD) Test Vehicles (AIAA 2016-3883)	1921
<i>John W. Van Norman, Artem Dyakonov, Mark Schoenenberger, Jody Davis, Suman Muppidi, Chun Y. Tang, Deepak Bose, Brandon Mobley, Ian G. Clark</i>	
Robust SJA-Based Nonlinear Trajectory Tracking Control Using Unmanned Aircraft LPV Model (AIAA 2016-3884)	1950
<i>Petr Kazarin, Vladimir V. Golubev, William T. MacKunis, Sherry Borener, Derek Hufty</i>	

APA-29: AERODYNAMIC DESIGN METHODOLOGIES II

Analysis of the Aerodynamic Performance of a Morphing Wing-Tip Demonstrator Using a Novel Nonlinear Vortex Lattice Method (AIAA 2016-4036)	1960
<i>Sugar Gabor Oliviu, Andreea Koreanschi, Ruxandra M. Botez, Mahmoud Mamou, Youssef Mebarki</i>	
A Genetic Algorithm Optimization Method for a Morphing Wing Tip Demonstrator Validated Using Infra Red Experimental Data (AIAA 2016-4037)	1983
<i>Andreea Koreanschi, Oliviu Sugar Gabor, Joran Acotto, Ruxandra M. Botez, Mahmoud Mamou, Youssef Mebarki</i>	
Variable-Fidelity Multidisciplinary Design Optimization for Innovative Control Surface of Tailless Aircraft (AIAA 2016-4038)	2001
<i>Jangho Park, Youngmin Jo, Seulgi Yi, Pradeep Raj, Seongim Choi</i>	
Transonic Aerodynamics Analysis for Multidisciplinary Design Optimization Applications (AIAA 2016-4039)	2017
<i>Molly Segee, Joseph A. Schetz, Rakesh K. Kapania</i>	
Research on the Parameters Optimization of Combination of Spike and Forward-facing Jet (AIAA 2016-4040)	2033
<i>Jiang Zhang, Handong Ma, Yongming Qin</i>	

Trajectory and Aerodynamic Control Optimization of Civil Aircraft Descent Under Hazard Situations Based on High-Fidelity Aerodynamic Database (AIAA 2016-4041)	2043
<i>Norazila Othman, Masahiro Kanazaki</i>	

APA-30: AERODYNAMIC – STRUCTURAL DYNAMICS INTERACTIONS II

Aerodynamic Study of a Pusher-Propeller Effects on a Simple Flap (AIAA 2016-4042)	2063
<i>Santiago Algozino, Julio Marañon, Juan Delnero, Iban Echapresto Garay</i>	
Aerodynamic Excitation on MLG Door Exposed to Vortices Emanating from NLG of an Aircraft Model (AIAA 2016-4043)	2077
<i>Shia-Hui Peng, Adam Jirasek, Mats Dalenbring, Peter Eliasson</i>	

VOLUME 4

Unsteady Pressure Measurement of Transonic Buffet on NASA Common Research Model (AIAA 2016-4044)	2091
<i>Shunsuke Koike, Makoto Ueno, Kazuyuki Nakakita, Atsushi Hashimoto</i>	
Steady Reynolds Averaged Navier Stokes Equation-Based Buffet Loads Estimation (AIAA 2016-4045)	2116
<i>Thomas S. Chyczewski</i>	
Delayed Detached Eddy Simulation of Supersonic Panel Aeroelasticity Using Fully Coupled Fluid Structure Interaction with High Order Schemes (AIAA 2016-4046)	2130
<i>Jiaye Gan, Gecheng Zha</i>	
Comparison of a Turbulent Boundary Layer Pressure Fluctuation Model to Hypersonic Cone Measurements (AIAA 2016-4047)	2150
<i>Justin A. Smith, Lawrence J. DeChant, Katya M. Casper, Mikhail Mesh, Richard V. Field</i>	

APA-32: LOW BOOM ACTIVITIES I

Near-Field Measurement of Post-Shock Pressure Modulation Induced by Supersonic Flight Model past a Grid Turbulence (AIAA 2016-4048)	2164
<i>Akihiro Sasoh, Akira Iwakawa, Daiki Furukawa, Yoma Aoki</i>	
Inlet Trade Study for a Low Boom Aircraft Demonstrator (AIAA 2016-4050)	2170
<i>Christopher Heath, John W. Slater, Sriram K. Rallabhandi</i>	

APA-33/FD-54: UNSTEADY WING AERODYNAMICS

Model Reduction in Discrete Vortex Methods for 2D Unsteady Aerodynamic Flows (AIAA 2016-4163)	2190
<i>Arun Vishnu Suresh Babu, Kiran Kumar Ramesh, Ashok Gopalathnam</i>	
Nonlinear Lifting-Line Algorithm for Unsteady and Post-stall Conditions (AIAA 2016-4164)	2207
<i>Joaquim N. Dias</i>	
A Subsonic Indicial Aerodynamics for the Unsteady Loads of Trapezoidal Wings (AIAA 2016-4165)	2218
<i>Marcello Righi, Marco Berci, Matteo Franciolini, Andrea Da Ronch, Daniel Kharlamov</i>	
Dynamic Stall Simulations on a Pitching Finite Wing (AIAA 2016-4166)	2242
<i>Kurt Kaufmann, Christoph Merz, Anthony D. Gardner</i>	
Dynamic Ground Effect Analysis using a Novel Sinking Grid Methodology (AIAA 2016-4167)	2259
<i>Partha Mondal, Nagaram Munikrishna, Nikhil V. Shende, Narayanarao Balakrishnan</i>	
Low-dimensional Modeling and Aerodynamics of Flexible Wings in Flapping Flight (AIAA 2016-4168)	2272
<i>Yan Ren, Haibo Dong</i>	
An Investigation Into the Effect of Airfoil Camber on the Aerodynamics of Mav Scale Cycloidal Propeller Under Hovering Status (AIAA 2016-4169)	2283
<i>Hailang Zhang, Yu Hu, GengQi Wang, Zhiwu Fan, Yanling Wang</i>	

APA-34/FD-55: VORTEX/VORTICAL FLOWS I

Vortex Induced Aerodynamic Forces on a Flat Plate in Ground Proximity (AIAA 2016-4170)	2313
<i>Jenny C. Holt, Kevin P. Garry, Renan Francisco Soares</i>	

The Vortex Aerodynamics of Delta Wings (AIAA 2016-4171)	2327
<i>ShiangYu Lee</i>	
Numerical Investigations of the Vortical Flow on Swept Wings with Round Leading Edges (AIAA 2016-4172)	2336
<i>Andreas Schuette</i>	
An Assessment of the Fast Multipole Method Applied to a Vortex Sheet Roll-Up Problem (AIAA 2016-4173)	2381
<i>Tulio Rodarte Ricciardi, William Wolf, Alex Bimbato</i>	
Numerical Investigation of Vortex Breakdown (AIAA 2016-4174)	2399
<i>Tjarke van Jindelt, Jan Willem van der Burg, Edwin T. van der Weide, Harry W. Hoeijmakers</i>	
Effect of Ground Obstacle Separation Distance on Wake Vortex Dissipation (AIAA 2016-4176)	2413
<i>Chung Hung J. Wang, Dan Zhao, Jorg U. Schluter, Frank N. Holzäpfel, Anton Stephan</i>	

APA-35: AIRFOIL/WING/CONFIGURATION AERODYNAMICS

Design, Analysis, and Evaluation of a Propulsive Wing Concept (AIAA 2016-4178)	2427
<i>Mike F. Kerho, Phillip J. Ansell, Steve D'Urso, Gavin Ananda, Aaron Perry</i>	
Canard-Wing Interference Effects on the Flight Characteristics of a Transonic Passenger Aircraft (AIAA 2016-4179)	2451
<i>Sean Harrison, Ryan A. Darragh, Peter E. Hamlington, Mehdi Ghoreyshi, Andrew J. Lofthouse</i>	
Numerical Investigation of the Aerodynamics of an Inverted Three-Element Airfoil in Ground Effect for Race Car Application (AIAA 2016-4180)	2478
<i>Qiulin Qu, Pingyang Zuo, Yunpeng Qin, Peiqing Liu, Ramesh K. Agarwal</i>	

APA-36: AERODYNAMIC DESIGN METHODOLOGIES III

Numerical Simulation of Wake FlowField Behind the C-130H Cargo Ramp (AIAA 2016-4182)	2491
<i>Mehdi Ghoreyshi, Keith Bergeron, Andrew J. Lofthouse</i>	
Research on the Effect of Propeller Slipstream on Twin boom UAV Trim Characteristic (AIAA 2016-4183)	2519
<i>Lili Chen, Zheng Guo, Zhongxi Hou</i>	
Detailed Study of Effects of Crosswind and Turbulence Intensity on Aircraft Wake-Vortex in Ground Proximity (AIAA 2016-4184)	2532
<i>Sindhu Paramasivam, Dan Zhao, Martin Skote, Jorg U. Schluter</i>	
Shock Effects on Rotating Detonation Waves in the Hydrogen-Air Mixture (AIAA 2016-4185)	2545
<i>Yu-Hui Wang, Jiangyan Yang, Chao Zhong</i>	
A Comparison of Computational and Experimental Results for Three-Dimensional Flow over a Undulating Inflatable Wing (AIAA 2016-4186)	2552
<i>Joshua Beltz, Raymond P. LeBeau</i>	
Design of a Cooling Duct for the Solar Cells on a Solar Powered Unmanned Aerial Vehicle to Improve Performance (AIAA 2016-4187)	2564
<i>Rowayne E. Murzello, Mehdi Nazarinia, Amanda J. Hughes</i>	

APA-39: AERODYNAMIC DESIGN METHODOLOGIES IV

Evaluation of Reduced-Order Models for Predictions of Separated and Vortical Flows (AIAA 2016-4325)	2583
<i>Ryan A. Darragh, Peter E. Hamlington, Mehdi Ghoreyshi, Andrew J. Lofthouse</i>	
Natural Laminar Flow Design for Wings with Moderate Sweep (AIAA 2016-4326)	2601
<i>Richard L. Campbell, Michelle N. Lynde</i>	
Expanding the Natural Laminar Flow Boundary for Supersonic Transports (AIAA 2016-4327)	2622
<i>Michelle N. Lynde, Richard L. Campbell</i>	
Towards an Effective Nonplanar Wing Design Strategy (AIAA 2016-4328)	2645
<i>Michael W. Lee, Kenneth D. Visser</i>	
Revisiting the Transonic Similarity Rule: Critical Mach Number Prediction Using Potential Flow Solutions (AIAA 2016-4329)	2660
<i>Jeffrey J. Kirkman, Timothy T. Takahashi</i>	

Aerodynamic Design Guidelines of Aircraft Dorsal Fin Through Numerical and Experimental Analyses (AIAA 2016-4330)	2680
<i>Fabrizio Nicolosi, Danilo Ciliberti, Pierluigi Della Vecchia, Salvatore Corcione</i>	

APA-40: WEAPONS AERODYNAMICS: MISSILE/PROJECTILE/GUIDED-MUNITIONS, CARRIAGE AND STORE SEPARATION

Numerical Study on Bending Body Projectile Aerodynamics (AIAA 2016-4331)	2693
<i>Eric B. Youn, Sidra I. Siltan</i>	
Flight Behaviors of a Complex Projectile using a Coupled CFD-based Simulation Technique: Closed-loop Control (AIAA 2016-4332)	2703
<i>Jubaraj Sahu, Frank Fresconi</i>	
A Computationally Efficient, Multi-fidelity Assessment of Jet Interactions for Highly Maneuverable Missiles (AIAA 2016-4333)	2723
<i>Anton Vanderwyst, Andrew Shelton, Christopher L. Martin</i>	
Nonlinear Rolling Motion of Triform Finned Missiles (AIAA 2016-4334)	2734
<i>Jesus Morote, Gabriel Liaño, José Jiménez</i>	
Store Separation Analyses by Means of Response Surface Modeling (AIAA 2016-4335)	2753
<i>Onur Özgür, Abdullah E. Çetiner, Bedri Yagiz, Goktan Guzel</i>	
CFD Based Response Surface Modeling with an Application in Missile Aerodynamics (AIAA 2016-4336)	2765
<i>Abdullah E. Çetiner, Bedri Yagiz, Goktan Guzel, Onur Özgür, Ilteris Koc</i>	
Author Index	