

AIAA Atmospheric Flight Mechanics Conference 2015

Held at the AIAA SciTech Forum 2015

**Kissimmee, Florida, USA
5-9 January 2015**

ISBN: 978-1-5108-0108-0

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

AFM BEST STUDENT PAPER COMPETITION I

Effect of Trail Aircraft Size on Sweet Spot Location for a Conventional Aircraft Pair in Formation (AIAA 2015-0011)	1
<i>Wendy Okolo, Atilla Dogan, William B. Blake</i>	
Lagrangian Flow Structures Around a Flapping Wing (AIAA 2015-0012)	15
<i>Mac MacFarlane, James Humbert</i>	
Evaluation of Hovering Thrust Performance of Shrouded Rotors for Multi-rotor UAVs to Reduce Weight (AIAA 2015-0013)	23
<i>Hikaru Otsuka, Keiji Nagatani, Kazuya Yoshida</i>	

AIRCRAFT FLIGHT DYNAMICS, HANDLING QUALITIES AND PERFORMANCE I

Program to Calculate the Performance of Airplanes Driven by a Fixed-Pitch Propeller (AIAA 2015-0015)	34
<i>Pedro J. Boschetti, Pedro J. Gonzalez, Elsa M. Cardenas</i>	
Computational Analysis of the Blade Number Effect on the Performance of a Ducted Propeller (AIAA 2015-0016)	49
<i>Carlos M. Lazaro Echavarria, Svetlana Poroseva</i>	
Experiment Design for Complex VTOL Aircraft with Distributed Propulsion and Tilt Wing (AIAA 2015-0017)	61
<i>Patrick C. Murphy, Drew Landman</i>	
NTSB Investigation of an Icing-Related Aerodynamic Stall Incident and Pilot Response (AIAA 2015-0018)	87
<i>Marie Moler, Dennis A. Crider, Roger Cox</i>	
Piloted Simulation Handling Qualities Assessment of a Business Jet Fly-By-Wire Flight Control System (AIAA 2015-0019)	102
<i>Tom Berger, Mark Tischler, Steven G. Hagerott</i>	
Controllability Analysis of a Mass-Actuated Airplane (AIAA 2015-0020)	140
<i>Sukru Akif Erturk, Atilla Dogan</i>	

AFM BEST STUDENT PAPER COMPETITION II

Black-box LTI modelling of flapping-wing micro aerial vehicle dynamics (AIAA 2015-0234)	154
<i>Sophie F. Armanini, Coen C. de Visser, Guido de Croon</i>	
Aerodynamic Modeling and Optimization of Sideslip Perching Maneuver (AIAA 2015-0235)	170
<i>Mir Alikhan, Tiauw H. Go</i>	

AIRCRAFT FLIGHT DYNAMICS, HANDLING QUALITIES AND PERFORMANCE II

Subset Simulation for Estimating Small Failure Probabilities of an Aerial System Subject to Atmospheric Turbulences (AIAA 2015-0236)	185
<i>David Löbl, Florian Holzapfel</i>	
Symmetric Steady Flapping Flight of Bird-Scale Aircraft, Using Bifurcation and Continuation Method (AIAA 2015-0237)	196
<i>Aditya A. Paranjape</i>	
Brain Control of Horizontal Airplane Motion - A Comparison of Two Approaches (AIAA 2015-0238)	206
<i>Tim Fricke, Vítor Paixão, Nuno Loureiro, Rui M. Costa, Florian Holzapfel</i>	
Exposing Unique Pilot Behaviors from Flight Test Data (AIAA 2015-0239)	218
<i>David H. Klyde, Philip C. Schulze, Peter M. Thompson</i>	
Model Order Reduction for Control Design of Flexible Free-Flying Aircraft (AIAA 2015-0240)	233
<i>Nikolaos D. Tantaroudas, Andrea Da Ronch, Kenneth J. Badcock, Yinan Wang, Rafael Palacios</i>	

Improved Models for the Ground Handling Assessment of Navy Aircraft (AIAA 2015-0241)	257
<i>David H. Klyde, Thomas Myers, Amanda K. Lampton, Marjorie Draper-Donley, Matthew Bishop</i>	

AERODYNAMIC PREDICTION METHODS

Linear Computational Fluid Dynamic Analysis of Dynamic Ground Effect of a Wing in Sink and Flare Maneuvers (AIAA 2015-0518)	271
<i>Gabriela Quijada, Pedro J. Boschetti</i>	
Computational Analysis of a Flow Around Two-Dimensional Streamlined Bodies with OpenFOAM (AIAA 2015-0519)	283
<i>Robert Habbib, Andrew Porteous, Carlos M. Lazaro Echavarria, Svetlana Poroseva, Scott M. Murman</i>	
Analytical Aerodynamic Force and Moment Coefficients of Axisymmetric Objects in Rarefied Flow (AIAA 2015-0520)	298
<i>Kenneth A. Hart, Kyle R. Simonis, Bradley A. Steinfeldt, Robert D. Braun</i>	
Kinetic Models and Gas Kinetic Schemes for Hybrid Simulation of Partially Rarefied Flows (AIAA 2015-0521)	311
<i>Simone Colonia, René Steijl, George N. Barakos</i>	
Trajectory Simulation of a Spinning Projectile Based on Variable Step Size CFD/RBD Method (AIAA 2015-0522)	341
<i>Gang Wang, Zheng Zeng, Qian Suo</i>	
Analytical Shock Standoff and Shape Prediction with Validation for Blunt Face Cylinder (AIAA 2015-0523)	353
<i>John D. Martel, Bruce Jolly</i>	

ATMOSPHERIC ENTRY, HYPERSONIC FLIGHT AND AEROASSIST TECHNOLOGY

A Comparison of Three Algorithms for Orion Drogue Parachute Release (AIAA 2015-0524)	364
<i>Daniel A. Matz, Robert D. Braun</i>	
Spatial Parameterization of Blunt Body Dynamics under Parachutes (AIAA 2015-0525)	385
<i>Mike P. Hughes</i>	
Coupled Inertial Navigation and Flush Air Data Sensing Algorithm for Atmosphere Estimation (AIAA 2015-0526)	399
<i>Chris D. Karlgaard, Prasad Kutty, Mark Schoenenberger</i>	
Free Flight Investigation of Atmospheric Entry Capsules in Low Subsonic Flow (AIAA 2015-0527)	417
<i>Arianit Preci, Ali Guelhan</i>	
The Flight Dynamics of the HIFiRE Flight 6 Research Vehicle (AIAA 2015-0528)	433
<i>David W. Adamczak, Michael A. Bolender</i>	

AFM BEST STUDENT PAPER COMPETITION III

Suppression of Wing Rock in Slender Delta Wing by Horizontal Strakes (AIAA 2015-0746)	454
<i>Saifur R. Bakaul, Yankui Wang, Wu Guangxing</i>	
Quadrotor System Identification Using the Multivariate Multiplex B-Spline (AIAA 2015-0747)	470
<i>Tim Visser, Coen C. de Visser, Erik-Jan Van Kampen</i>	
Non-Iterative Adaptive Limit and Control Margin Estimation with Concurrent Learning (AIAA 2015-0748)	483
<i>Gonenc Gursoy, Ilkay Yavrucuk</i>	
Wing Sensor Placement for Gust Disturbance Rejection (AIAA 2015-0749)	498
<i>Lina Castano, Simone Airoidi, Terrence McKenna, James Humbert</i>	

AIRCRAFT FLIGHT DYNAMICS, HANDLING QUALITIES AND PERFORMANCE III

Evaluation of Aircraft Model Upset Behaviour Using Wind Tunnel Manoeuvre Rig (AIAA 2015-0750)	515
<i>Sergio A. Araujo-Estrada, Mark H. Lowenberg, Simon Neild, Mikhail Goman</i>	
The Effects of Stick Force Gradient on Pilot Mental Demand (AIAA 2015-0751)	535
<i>Mike Bromfield, Guy Gratton, Mark Young</i>	
Improved Obstacle Clearance Capability of a Transport Aircraft Using a Modified Climb-Out Flight Profile (AIAA 2015-0752)	548
<i>Lance V. Bays, Kevin E. Halpin</i>	

Power Efficient Trim Solutions for the Hybrid Wing Body in Approach Conditions (AIAA 2015-0754)	558
<i>Daniel C. Garmendia, Dimitri N. Mavris</i>	
Aircraft Input Prediction in the Presence of Spatially Varying Wind Field (AIAA 2015-0755)	571
<i>Jane-Wit Kamppoon, Wendy Okolo, Sukru Akif Erturk, Onur Daskiran, Atilla Dogan</i>	
Wind Field Estimation and Its Utilization in Trajectory Prediction (AIAA 2015-0756)	594
<i>Jane-Wit Kamppoon, Wendy Okolo, Sukru Akif Erturk, Onur Daskiran, Atilla Dogan</i>	

LAUNCH VEHICLE, MISSILE, AND PROJECTILE FLIGHT MECHANICS I

Integration of Grid Fins for the Optimal Design of Missile Systems (AIAA 2015-1017)	620
<i>Timothy W. Ledlow, John E. Burkhalter, Roy J. Hartfield</i>	
An Improved Method to Calculate the Nonlinear Rolling Moment Due to Differential Fin Deflection of Canard Controlled Missiles (AIAA 2015-1018)	650
<i>Frankie G. Moore, Linda Moore, Gregory McGowan</i>	
Robust Stability Evaluation of the Space Launch System Control Design: A Singular Value Approach (AIAA 2015-1019)	671
<i>Jing Pei, Jerry Newsom</i>	
Euler-Lagrange Optimal Control for Symmetric Projectiles (AIAA 2015-1020)	682
<i>Bradley T. Burchett, Austin L. Nash</i>	
Elliptical Trajectory Guidance Law with Terminal Impact Angle Constraint (AIAA 2015-1021)	694
<i>Tingting Zhang, Haoping SHE</i>	

FLIGHT TEST AND SYSTEM IDENTIFICATION

High Angle of Attack Model Identification with Compressibility Effects (AIAA 2015-1477)	700
<i>Joaquim N. Dias</i>	
Fuel State Reconstruction for Maneuvering Aircraft (AIAA 2015-1478)	715
<i>Erol Ozger</i>	
Quadrotor 6-DOF HIL Simulation and Verification Using a 6-axis Load Cell (AIAA 2015-1479)	735
<i>Travis Fields, Logan M. Ellis, Greg King</i>	
System Identification and Handling Quality Analysis of a UAV from Flight Test Data (AIAA 2015-1480)	749
<i>Orkun Simsek, Ozan Tekinalp</i>	
Flight test results of Observer/Kalman Filter Identification of the Pegasus unmanned vehicle (AIAA 2015-1481)	763
<i>Timothy D. Woodbury, John Valasek, Frank Arthurs</i>	

MAV, UAV AND AEROSERVOELASTIC VEHICLES

The Gust Resistant MAV - Aerodynamic Measurements, Performance Analysis, and Flight Tests (AIAA 2015-1684)	784
<i>Andrzej Zyluk, Krzysztof Sibilski</i>	
An Empirical Model of Rotorcraft UAV Downwash for Disturbance Localization and Avoidance (AIAA 2015-1685)	802
<i>Derrick Yeo, Elena Shrestha, Derek A. Paley, Ella M. Atkins</i>	
Modal Matching for LPV Model Reduction of Aeroservoelastic Vehicles (AIAA 2015-1686)	816
<i>Julian Theis, Bela Takarics, Harald Pfifer, Gary J. Balas, Herbert Werner</i>	
Comparative Study of Wing's Motion Patterns on Various Types of Insects on Resemblant Flight Stages (AIAA 2015-1688)	828
<i>Fernando P. Neves, Jorge M. Barata, Pedro A. Manquinho</i>	
A Bio-inspired UAV Leg-Foot Mechanism for Landing, Grasping and Perching Tasks (AIAA 2015-1689)	849
<i>Pu Xie, Ou Ma, Zhen Zhao, Lin Zhang</i>	

LAUNCH VEHICLE, MISSILE, AND PROJECTILE FLIGHT MECHANICS II

Calculating Expectation of Casualty for Hypersonic Reusable Launch Vehicles (AIAA 2015-1908)	864
<i>Jason A. Lechniak, Christopher C. Chinske, Ryan W. Carr, Timothy R. Jorris</i>	

Uncertainty Engagement Analysis of Exoatmospheric Interceptor Based on Reachable Set Model (AIAA 2015-1909)	880
<i>Chai Hua, Lei Chen, Yi Zhang, Guojin Tang</i>	
Capturing the Global Feasible Design Space for Launch Vehicle Ascent Trajectories (AIAA 2015-1910)	894
<i>Michael J. Steffens, Dimitri N. Mavris, Stephen J. Edwards</i>	
Guidance and Control of a Man Portable Precision Munition Concept (AIAA 2015-1911)	908
<i>Frank Fresconi, Jonathan D. Rogers</i>	
Author Index	