

30th AIAA Aerodynamic Measurement Technology and Ground Testing Conference 2014

Held at the AIAA Aviation Forum 2014

**Atlanta, Georgia, USA
16-20 June 2014**

ISBN: 978-1-63266-941-4

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

TABLE OF CONTENTS

GROUND TEST FACILITY OPERATION AND IMPROVEMENT

Mach Number Control Improvement in ONERA S1MA Large Transonic Wind Tunnel (AIAA 2014-2108).....	1
<i>Pascal Crozier, Christian Chargy, Robert Pichon</i>	
Neural-Network Control of Wind Tunnel Test Conditions (AIAA 2014-2109).....	25
<i>Mark R. Rennie, Peter Sutcliffe, Alexander Vorobiev, Alan B. Cain</i>	
Exploiting the Characteristics of Kevlar-Wall Wind Tunnels for Conventional Aerodynamic Measurements (AIAA 2014-2110).....	36
<i>Kenneth A. Brown, William J. Devenport, Aurelien Borgoltz</i>	
Reducing Cost and Increasing Speed: Managing your Test Capital at the Intersection of Critical Value Streams and Knowledge (AIAA 2014-2111).....	74
<i>Paul McNamara</i>	

SPECTROSCOPIC VELOCIMETRY

Femtosecond Laser Electronic Excitation Tagging (FLEET) Fundamental Pulse Energy and Spectral Response (AIAA 2014-2227)	91
<i>Nicholas J. DeLuca, Richard B. Miles, Waruna D. Kulatilaka, Naibo Jiang, James R. Gord</i>	
Three Component Velocity and Acceleration Measurement Using FLEET (AIAA 2014-2228)	98
<i>Paul M. Danehy, Brett F. Bathel, Nathan D. Calvert, Arthur Dogariu, Richard B. Miles</i>	
2-D Velocity and Vorticity Measurements with FLEET (AIAA 2014-2229).....	105
<i>Nathan D. Calvert, Arthur Dogariu, Richard B. Miles</i>	
Planar Doppler Velocimetry for Transonic Flowfields in the AEDC 16T Wind Tunnel (AIAA 2014-2230).....	121
<i>Joseph A. Wehrmeyer, Kenneth Scott, Fred Heltsley, Ron Porter</i>	
Diagnosis of High Speed Flows Using Filtered Rayleigh Scattering (AIAA 2014-2231)	150
<i>Jacob George, Tom P. Jenkins, Richard B. Miles</i>	
Planar Imaging of Shock Waves at Low Pressure Using Filtered Rayleigh Scattering (AIAA 2014-2232).....	162
<i>Tom P. Jenkins, Jacob George, Flavio Poehlmann</i>	

IMAGING METHODS

Application of Stereoscopic Imaging in Aerospace Ground Testing (AIAA 2014-2519)	173
<i>Bradley Winkleman, Kenneth Scott, Gregg R. Beitel, Todd B. VanPelt, Benjamin Weaver, Marcus S. Conner</i>	
Preliminary Investigation of Three-Dimensional Flame Measurements with a Plenoptic Camera (AIAA 2014-2520)	183
<i>Jeffrey Bolan, Kyle C. Johnson, Brian S. Thurow</i>	
Visualization of Flow Separation Around an Atmospheric Re-entry Capsule at Low-subsonic Mach Number Using Background-oriented Schlieren (BOS) (AIAA 2014-2521)	194
<i>Toshiharu Mizukaki, Stephen E. Borg, Paul M. Danehy, Scott M. Murman</i>	
Application of a Novel Projection Focusing Schlieren System in NASA Test Facilities (AIAA 2014-2522)	203
<i>Amy F. Fagan, Drew L'Esperance, Khairul Q. Zaman</i>	
Free Flight Measurement Technique in Shock Tunnel (AIAA 2014-2523).....	217
<i>Bastien Martinez, Myriam Bastide, Pierre Wey</i>	
Development of a Diode-Pumped 100-ms Quasi-Continuous Burst-Mode Laser for High-Speed Combustion Diagnostics (AIAA 2014-2524)	229
<i>Joseph D. Miller, James R. Gord, Terrence R. Meyer, Mikhail N. Slipchenko, Jason G. Mance, Suke Roy</i>	

SPECTROSCOPIC TEMPERATURE MEASUREMENT

WIDECAWS Measurements of Major Species Concentration and Temperature in an Air-Ethylene Flame (AIAA 2014-2525).....	235
<i>Emanuela Gallo, Luca Cantu, Andrew D. Cutler, Mohammad J. Rahimi, Harsha K. Chelliah</i>	

High-Speed Imaging Optical Pyrometry for Study of Boron Nitride Nanotube Generation (AIAA 2014-2526)	241
<i>Jennifer A. Inman, Paul M. Danehy, Stephen B. Jones, Joseph W. Lee</i>	
Rotational Temperature Measurement in an Arc-Heated Wind Tunnel by Laser Induced Fluorescence of Nitric Oxide A-X(0,0) (AIAA 2014-2528)	254
<i>Marco Kirschner, Tobias Sander, Christian Mundt</i>	
Molecular Rayleigh Scattering to Measure Fluctuations in Density and Temperature in Low Speed Heated Wind Tunnel Flows (AIAA 2014-2529)	271
<i>Jayanta Panda, Stephen Schery</i>	

GROUND TEST FACILITY CHARACTERIZATION

Characterization of the NASA Langley Arc Heated Scramjet Test Facility Using NO PLIF (AIAA 2014-2652)	281
<i>Forrest G. Kidd, Venkateswaran Narayanaswamy, Paul M. Danehy, Jennifer A. Inman, Brett F. Bathel, Karen F. Cabell, Neal Hass, Diego Capriotti, Tomasz G. Drozda, Craig T. Johansen</i>	
Design and Calibration of the AEDC H3 Mach 3.0 High Heat Flux Nozzle (AIAA 2014-2653)	298
<i>Gary Hammock</i>	
A Study of Potential Test Capabilities of the NASA Langley 0.3-Meter Transonic Cryogenic Wind Tunnel (AIAA 2014-2654)	318
<i>Ben D. Phillips, Colin P. Britcher</i>	
Status of the Holloman High Speed Maglev Test Track (HHSMTT) (AIAA 2014-2655)	328
<i>Husam ("Sam") Gurol, Don Ketchen, Leo Holland, Mike Hooser, David Minto, Neil Bosmajian, Russell M. Cummings</i>	
Numerical Studies of Acoustic and Thermal Coupling in Sonic Fatigue Tests for Hypersonic Vehicle (AIAA 2014-2656).....	343
<i>Wenjun Yu, Siyang Zhong, Xun Huang</i>	
Multiple Flow Regimes in a Single Hypersonic Shock Tube Experiment (AIAA 2014-2657)	352
<i>Mikhail Kotov, Larisa Ruleva, Sergey Solodovnikov, Igor Kryukov, Sergey Surzhikov</i>	

DEVELOPMENTS IN PARTICLE IMAGE VELOCIMETRY

Hierarchy of Hybrid Unsteady-Flow Simulations Integrating Time-Resolved PIV/PTV with Unsteady CFD (AIAA 2014-2658)	370
<i>Fujio Yamamoto, Takao Suzuki</i>	
Time Resolved High Dynamic Range PIV Using Local Uncertainty Estimation Methods (AIAA 2014-2659)	382
<i>Tim Persoons</i>	
Self-Calibration Performance in Stereoscopic PIV Acquired in a Transonic Wind Tunnel (AIAA 2014-2660).....	394
<i>Steven J. Beresh, Justin L. Wagner, Brian O. Pruett, John Henfling, Russell Spillers, Barton L. Smith</i>	
PIV in the Trisonic GasDynamics Facility (AIAA 2014-2661).....	416
<i>Mei-Ling Liber, Mark F. Reeder, Daniel Wolfe, Ryan F. Schmit, Benjamin J. Hagen</i>	
Modeling the Effect of Refraction at a Flat Interface on Plenoptic Particle Reconstruction (AIAA 2014-2662)	431
<i>Chelsea M. Thomason, Timothy W. Fahringer, Kyle C. Johnson, Brian S. Thurrow</i>	

AERODYNAMIC FORCE AND POWER MEASUREMENT

A New Global Regression Analysis Method for the Prediction of Wind Tunnel Model Weight Corrections (AIAA 2014-2797)	442
<i>Norbert M. Ulbrich, Max Amaya, Thomas Bridge</i>	
Development of a New Rig with Enhanced Specifications for Wind Tunnel Tests of "Isolated" CROR Propulsion Systems (AIAA 2014-2798)	479
<i>Jean-François Séchaud</i>	
Development and Feasibility of a Non-Invasive, Wireless Parachute Load Distribution Measuring System (AIAA 2014-2799)	493
<i>Travis Fields</i>	

SURFACE SENSORS AND PROBES

Skin Friction Sensor Validation for High-Speed, High-Enthalpy Flow Applications (AIAA 2014-2800)	505
<i>Ryan J. Meritt, Joseph A. Schetz</i>	

Rapid Flow Surveys via Rotating Rake System and Use in Powered Wind Tunnel Models (AIAA 2014-2801)	524
<i>Michael Lieu, Mark Drela, Alejandra Uranga, Edward Greitzer</i>	

SURFACE FIELD MEASUREMENTS

Transition Detection for Low Speed Wind Tunnel Testing Using Infrared Thermography (AIAA 2014-2939)	538
<i>Liselle A. Joseph, Aurelien Borgoltz, William J. Devenport</i>	
Large-Span, Non-Contact Surface Profilometry for Laminar-Flow Diagnostics (AIAA 2014-2940).....	558
<i>Brian K. Crawford, Glen T. Duncan, David E. West, William S. Saric</i>	
Characterization of Signal Output of Pressure-Sensitive Paint by Quantum Efficiency Using Integration Sphere (AIAA 2014-2941)	565
<i>Hiroko Saeki, Hitoshi Ishikawa, Hirotaka Sakaue</i>	
Temperature Cancellation Method of Motion-Capturing PSP System (AIAA 2014-2942).....	572
<i>Yuki Yamada, Taika Okabe, Takeshi Miyazaki, Hirotaka Sakaue</i>	
Fast Response PSP Measurement In a Hypersonic Wind Tunnel (AIAA 2014-2943)	581
<i>Xingju Xiang, Minglei Yuan, Jingbo Yu, Liusheng Chen</i>	

Author Index