



# Thermal and Fluids Analysis Workshop 2011

*Langley Research Center*



Proceedings of a workshop  
hosted by the Langley Research Center  
at the Newport News Marriott at City Center  
Newport News, Virginia  
August 15 - 19, 2011

## Passive Thermal Paper Sessions

*Chairs: Stephen Miller, NASA - Johnson Space Center/Langley Research Center*

*Chris Kostyk, NASA - Dryden Flight Research Center*

### Session #1

- TFAWS2011-PT-01 [A Projection-Based Model Order Reduction Simulation Tool for Spacecraft Thermal Analysis](#)  
*Yi Wang, Hongjun Song & Kapil Pant, CFD Research Corporation*  
*Hume Peabody, Jentung Ku, Charles D. Butler, NASA - Goddard Space Flight Center*
- TFAWS2011-PT-03 [Thermal Response of Materials to a High Energy Radiation Heat Source](#)  
*Matthew Carroll, Texas A&M at Galveston*
- TFAWS2011-PT-04 [MMS Thermal Design Life Cycle](#)  
*Rommel Zara, Vertex Aerospace/NASA - Goddard Space Flight Center*
- TFAWS2011-PT-06 [Improvements to a Response Surface Thermal Model for Orion](#)  
*Stephen Miller, NASA - Johnson Space Center/Langley Research Center*  
*William Q. Walker - West Texas A&M*

### Session #2

- TFAWS2011-PT-07 [Statistical Analysis of Thermal Analysis Margin](#)  
*Matthew Garrison, NASA - Goddard Space Flight Center*
- TFAWS2011-PT-08 [FASTSAT Thermal Model Correlation](#)  
*Callie McKelvey, NASA - Marshall Space Flight Center*
- TFAWS2011-PT-09 [Thermal Testing and Correlation of an Instrument Thermal Simulator In the NASA Solar Furnace Facility](#)  
*Kelly Smith, Mark Phillips & Mark Ferris, Southwest Research Institute*  
*Harold Gerrish and Jimmy Sisco, NASA - Marshall Space Flight Center*
- TFAWS2011-PT-10 [Pressure Controlled Heat Pipes](#)  
*W. G. Anderson, J. R. Hartenstine, C. Tarau, D. B. Sarraf & K. L. Walker, Advanced Cooling Technologies, Inc.*
- TFAWS2011-PT-11 [Variable Conductance Heat Pipe for a Lunar Variable Thermal Link](#)  
*C. J. Peters, J. R. Hartenstine, C. Tarau & W. G. Anderson, Advanced Cooling Technologies, Inc.*
- TFAWS2011-PT-12 [Loop Heat Pipe with Thermal Control Valve for Variable Thermal Conductance](#)  
*J.R. Hartenstine, W.G. Anderson & K.L. Walker, Advanced Cooling Technologies, Inc.*

### Session #3

- TFAWS2011-PT-13 [Analytical Approach in DECOM](#)  
*Deepak Patel, NASA - Goddard Space Flight Center*



- TFAWS2011-PT-14 [DECOM Validation](#)  
*Deepak Patel, NASA - Goddard Space Flight Center*
- TFAWS2011-PT-16 [Thermal Analysis Workflow in Support to TPS Seams and Interface Design of Re-Entry Vehicles](#)  
*Lorenzo Andrioli & Massimo Antonacci, Thales Alenia Space*  
*Alessandro Mannarelli, SSE - Sofiter System Engineering*
- TFAWS2011-PT-17 [International Space Station Passive Thermal Control System Analysis, Top Ten Lessons-Learned](#)  
*John Iovine, NASA - Johnson Space Center*
- TFAWS2011-PT-19 [Comparative Functionality of the Hemicube, Deterministic and Monte Carlo Radiation Calculation Methods](#)  
*Carl Poplawsky, Chris Jackson & Chris Blake, Maya Heat Transfer Technologies*
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## Active Thermal Paper Sessions

*Chairs: Laurie Walls, NASA - Kennedy Space Center*  
*Callie McKelvey, NASA - Marshall Space Flight Center*

### Session #1

- TFAWS2011-AT-01 [An Active Broad Area Cooling Model of a Cryogenic Propellant Tank with a Single Stage Reverse Turbo-Brayton Cycle Cryocooler](#)  
*Monica Guzik & Thomas Tomsik, NASA - Glenn Research Center*
- TFAWS2011-AT-02 [Modeling a Cryogenic Tank Pressurization with Active Thermal Cooling Transient Profile Using Excel and Visual Basic for Applications](#)  
*Monica Guzik, David Plachta & Justin Elchert, NASA - Glenn Research Center*
- TFAWS2011-AT-03 [Broad Area Cooler Concepts for Cryogenic Propellant Tanks](#)  
*Robert Christie, Thomas Tomsik & Monica Guzik, NASA - Glen Research Center*
- TFAWS2011-AT-05 [Generalized Fluid System Simulation Program \(GFSSP\) Version 6 - General Purpose Thermo-Fluid Network Analysis Software](#)  
*Alok Majumdar, Andre LeClair & Ric Moore, NASA - Marshall Space Flight Center*  
*Paul Schallhorn, NASA - Kennedy Space Center*
- TFAWS2011-AT-06 [Comparison of Surface Area and Pumping Power Requirements in Heat Exchangers using Nanofluids and Basefluids Suitable for NASA Applications](#)  
*Ravikanth Vajjha & Debendra Das, University of Alaska Fairbanks*

### Session #2

- TFAWS2011-AT-10 [Venting of a Water/Inhibited Propylene Glycol Mixture in a Vacuum Environment - Characterization and Representative Test Results](#)  
*Eugene K. Ungar & Lisa R. Erickson, NASA - Johnson Space Center*



TFAWS2011-AT-11 [Role of Direct Numerical Simulation of Multiphase Flow in Fluid](#)  
*Sadegh Dabiri & Gretar Tryggvason, University of Notre Dame*  
*Jiacai Lu, Worcester Polytechnic Institute*

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## **Aerothermal Paper Session**

*Chairs: Mark D'Agostino, NASA - Marshall Space Flight Center*  
*Aga Goodsell, NASA - Ames Research Center*

### **Session #1**

- TFAWS2011-AE-01 [Simulation of Flow through Supersonic Cruise Nozzle: A Validation Study](#)  
*Balasubramanyam Sasanapuri, Manish Kumar & Sutikno Wirogo, ANSYS Inc.*
- TFAWS2011-AE-02 [The Experimental Measurement of Aerodynamic Heating about Complex Shapes at Supersonic Mach Numbers](#)  
*Richard Neumann & Del Freeman, United Space Alliance*
- TFAWS2011-AE-03 [Space Shuttle Boundary Layer Transition Flight Experiment Overview](#)  
*Karen Berger, NASA - Langley Research Center*  
*Brian Anderson, Charles Campbell, Michael Garske & Luis Saucedo, NASA - Johnson Space Center*  
*Gerald Kinder, The Boeing Company*  
*Ann Micklos, United Space Alliance/NASA - Kennedy Space Center*
- TFAWS2011-AE-04 [Post-Flight Analysis of HIFiRE-1 Aerothermal Data](#)  
*Tom Squire, NASA - Ames Research Center*  
*Parul Agrawal & Dinesh Prabhu, ERC Inc.*
- TFAWS2011-AE-05 [Analysis of Post-Reentry Heating and Soak-Back Affects in Unsealed Reentry Vehicles](#)  
*Erika Bannon, Jared Leidich & Alex Walker, Paragon Space Development Corporation*
- TFAWS2011-AE-06 **Combined Aerothermal CFD and Material Response Simulations for MSL**  
*Todd White, NASA - Ames Research Center*
- TFAWS2011-AE-11 [Numerical Simulation of Massively Separated Flow over Apollo Command Module: Validation Study](#)  
*Balasubramanyam Sasanapuri, Manish Kumar, Angela Lestari, Konstantine Kourbatski & Sutikno Wirogo, ANSYS Inc.*
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## **Interdisciplinary Paper Session**

*Chairs: Georg Siebes, NASA - Jet Propulsion Laboratory*  
*Eric Grob, NASA - Goddard Space Flight Center*

## Session #1

- TFAWS2011-IN-01 [Quantification of Margins and Uncertainties for Model-Based Qualification of Flight System Performance](#)  
*Lee Peterson, NASA - Jet Propulsion Laboratory*
- TFAWS2011-IN-02 [An Assessment of the Sandia Sierra Mechanics Simulation Suite for High Precision Spacecraft Thermal Models](#)  
*Lee Peterson, NASA - Jet Propulsion Laboratory*
- TFAWS2011-IN-03 [Thermostructural Analysis of the SOFIA Fine Field and Wide Field Imager Components Subjected to Convective Thermal Shock](#)  
*Chris Kostyk, NASA - Dryden Flight Research Center*
- TFAWS2011-IN-04 [External Occulter Analysis and Design Using the Cielo Finite Element Software](#)  
*Mike Chainyk, NASA - Jet Propulsion Laboratory*
- TFAWS2011-IN-05 [Wide-Field Infrared Survey Explorer \(WISE\), Solid Hydrogen Cryogenic Support System](#)  
*Brian Thompson, Space Dynamics Laboratory*  
*Scott Schick & Brett Lloyd, Practical Technology Solutions Inc.*
- TFAWS2011-IN-07 [Recent Advances in a Coupled Multiphysics Analysis Capability for Hypersonic Vehicle Structures](#)  
*R. S. Miskovich, E. L. Blades, M. Nucci & P. Shah, ATA Engineering*  
*E. A. Luke, Mississippi State University*
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## Short Courses

### [Aerothermal Flight Instrumentation Course](#)

*Tom Horvath, NASA - Langley Research Center*  
*Colin Brooks, NASA - Marshall Space Flight Center*  
*Chris Parlier, NASA - Kennedy Space Center*  
*Debbie Levin, Penn State University*

### [Design of Experiments \(DoE\) and Statistical Methods Course](#)

*Wayne Adams, Stat-Ease, Inc.*

### [Thermo-Electric Cooler Design Course](#)

*Eric Grob, NASA - Goddard Space Flight Center*

### [Thermal Properties Testing for Accurate Analysis Course](#)

*Kamran Daryabeigi, NASA - Langley Research Center*