Active Thermal & Fluids Paper Session I

Location: Spinnaker Conference Room, Time: 8:00AM-11:15AM

Session Chair: Brian Motil (GRC) & Ryan Edwards (GRC)

8:00 – 8:30 **Numerical and Experimental Investigation of River Hydrokinetic Turbine for Water Pumping Application**
TFAWS18-AT-02
Muzammil Ejaz, Mohammad Fozan ur Rab, Fahad Qureshi, Hassan, and Wajiha Rehman

8:30 – 9:00 **Demonstration of Copper-Water Heat Pipes and HiK Plates on the International Space Station**
TFAWS18-AT-03
Mohammed Ababneh, Calin Tarau, William Anderson, Angel Alvarez-Hernandez, Stephania Ortega, Jeffery Farmer, and Robert Hawkins

9:00 – 9:30 **Ammonia Vent of the External Thermal Control System (EATCS) Radiator #3 Flow Path #2 on the International Space Station (ISS)**
TFAWS18-AT-01
Darnell Cowan

9:30 – 10:00 **Next Generation of High-Heat-Flux Heat Pipes for Space Thermal Control Applications**
TFAWS18-AT-04
Mohammed Ababneh, Calin Tarau, William Anderson, and Jesse Fisher

10:00 – 10:15 **Break**

10:15 – 10:45 **Modeling and Characterization of Shape Memory Alloy-Based Morphing Radiators**
TFAWS18-AT-20
Christopher Bertagne

10:45 – 11:15 **Mitigation of Orion Ammonia Boiler Outlet Coolant Thermal Stratification**
TFAWS18-AT-15
Eugene Ungar and Lauren Foley

Active Thermal & Fluids Paper Session II

Location: Clipper Conference Room, Time: 1:15PM-3:15PM

Session Chair: Brian Motil (GRC) & Ryan Edwards (GRC)

13:15 – 13:45 **Overview and Analysis of the Europa Clipper Thermal Control System**
TFAWS18-AT-19
Christopher Bertagne, Pradeep Bhandari, Jenny Hua, Raymond Lee, Arthur Mastropietro, Hared Ochoa, Anthony Paris, and Bruce Williams

13:45 – 14:15 **Thermal and Hydraulic Analysis of Europa Clipper Heat Rejection System Thermal Control Valves**
TFAWS18-AT-14
Razmig Kandilian, Pradeep Bhandari, and Arthur Mastropietro

14:15 – 14:45 **Thermal Modeling of Zero Boil Off Tank Experiment**
TFAWS18-AT-17
Erin Tesny and Daniel Hauser

14:45 – 15:15 **CFD Analysis of NACA-0018 and NACA-0021 Blade Profile of Darrieus-Type Hydro Rotor Performance in Vortex**
TFAWS18-AT-08
Wajiha Rehman and Mohammad Fozan ur Rab

Active Thermal & Fluids Paper Session III

Location: Spinnaker Conference Room, Time: 8:00AM-11:15AM

Session Chair: Brian Motil (GRC) & Ryan Edwards (GRC)

8:00 – 8:30 **A Volume of Fluid Based Numerical Algorithm for Simulating Multiphase Incompressible Flows with Large Density Discontinuities**
TFAWS18-AT-12
Joshua Wagner and C. Fred Higgs III

8:30 – 9:00 **Photovoltaic Thermal Control System Flow Control Valve Actuator Duty Cycle after Addition of Lithium-Ion Batteries**
TFAWS18-AT-11
Matthew Jurick, Garry Livesay, and Keyla Robles

9:00 – 9:30 **Increased Control of Squeeze-Film Performance with Magnetohydrodynamics and Surface Roughness: Theory and Modelling**
TFAWS18-AT-10
Jordan Wagner and C. Fred Higgs III

9:30 – 10:00 **Nucleate Boiling Heat Transfer Enhancement with Electrowetting**
TFAWS18-AT-07
Aritra Sur, Yi Lu, Carmen Pascente, Paul Ruchhoeft, Vishal Talari, and Dong Liu

10:00 – 10:15 **Break**

10:15 – 10:45 **Suppression of Leidenfrost State Using Electrically Induced Interfacial Instabilities**
TFAWS18-AT-06
Yi Lu, Vishal Talari, Jiming Bao, Dong Liu

10:45 – 11:15 **Heat Transfer Augmentation via In-Situ Nanofluids Synthesis and Regenerative Nanofin Coatins**
TFAWS18-AT-22
Brandon Dooley and Debjyoti Banerjee

Aerothermal/Cryothermal Combined Paper Session

Location: Clipper Conference Room, Time: 1:15PM-5:00PM

Session Chair: Monica Guzik (GRC)

13:15 – 13:45 **The Design and Aero Thermodynamic Analysis of Inversely Derived Scramjet Configurations**
TFAWS18-AE-01
Frederick Ferguson, Dehua Feng, and Julio Mendez

13:45 – 14:15

14:15 – 14:45 **CO2 Cryofreezer Coldhead and Cycle Design Insights for Mars ISRU**
TFAWS18-CT-01
Jared Berg and Malay Shah

14:45 – 15:15 **Cryogenic thermophysical properties measurements of materials at the cryogenics and fluids branch, Goddard Space Flight Center**
TFAWS18-CT-02
Amir E. Jahromi, James G. Tuttle, Edgar R. Canavan

15:15 – 15:30 **Break**

15:30 – 16:00 **Numerical Modeling of Thermal Stratification in Cryogenic Propellant Tanks**
TFAWS18-CT-04
Xiao-Yen Wang, Jonathan Harrison, Andy Noonan, Pooja Desai

16:00 – 16:30 **Cryogenic Multilayer Insulation Theory and an Analysis of Seams under a Variety of Assumptions**
TFAWS18-CT-05
Justin Elchert

16:30 – 17:00 **Development of a 50 mK – 10 K flight-worthy vibration-free continuous Adiabatic Demagnetization Refrigerator**
TFAWS18-CT-06
Amir E. Jahromi

ITAR Paper Session

Location: Clipper Conference Room, Time: 10:30AM-11:00AM

Session Chair: Christopher Massina (JSC)
Location: Clipper Conference Room

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10:30 – 11:00 **Modeling on Clearing Liquid Blockage in the Helium Pressure Line of a Propellant Tank**
TFAWS18-ITAR-03
Xiao-Yen Wang, Glenn Research Center

Interdisciplinary Paper Session I

Location: Spinnaker Conference Room, Time: 1:45PM-4:00PM

Session Chair: Chris Evans (MSFC)

13:45 – 14:15 **Two-Phase Flow System Design Status of the Flow Boiling and Condensation Experiment (FBCE)**
TFAWS18-IN-14
Jesse deFiebre and Monica Guzik

14:15 – 14:45 **Proof of Concept Design and Analysis of heat Reutilization of a Solid Oxide Electrolyzer Cell for Oxygen Supply on Mars**
TFAWS18-IN-06
Samuel Ogletree, Shan Mohammed, and M. A. Rafe Biswas

14:45 – 15:15 **Temperature Controller Design of a High Temperature Ceramic Transport Membrane System for Oxygen Production using a Lumped Thermal Modeling Approach**
TFAWS18-IN-11
Kevin Fuentes, Samuel Ogltree, Shan Mohammed and M. A. Rafe Biswas

15:15 – 15:30 **Break**

15:30 – 16:00 **Validating Electrochemical, Thermal, and Fluidic Performance of a PEM Fuel Cell System Using GT SUITE**
TFAWS18-IN-16
Ryan Gilligan, Monica Guzik, Ian Jakupca, and Phillip Smith

Interdisciplinary Paper Session II

Location: Spinnaker Conference Room, Time 1:15PM-3:15PM

Session Chair: Chris Evans (MSFC)

13:15 – 13:45 **Numerical and Theoretical Investigations of Compressible Boundary Layers**
TFAWS18-IN-09
Frederick Ferguson, Tasmin Hossain, and Julio Mendez

13:45 – 14:15 **Measurement of the Effective Radial Thermal Conductivities of 18650 and 26650 Lithium-Ion Battery Cells**
TFAWS18-IN-08
Harsh Bhundiya, Melany Hunt, and Bruce Drolen

14:15 – 14:45 **Thermal Modeling and Correlation of the Space Environments complex Vacuum Chamber and Cryoshroud**
TFAWS18-IN-17
Erik Stalcup

14:45 – 15:15 **Characterization of a 50kW Inductively Coupled Plasma Torch for Testing of Ablative Thermal Protection Material**
TFAWS18-IN-21
Benton Greene, Noel Clemens, Philip Varghese, Stanley Bouslog, and Steven Del Papa

Interdisciplinary Paper Session III

Location: Spinnaker Conference Room, Time: 1:15PM-5:00PM

Session Chair: Chris Evans (MSFC)

13:15 – 13:45 **Experimental Study of the Effects of Xenon Plasma Erosion on Spacecraft Thermal Control Surfaces**
TFAWS18-IN-20
Evan Racine

13:45 – 14:15 **Modeling a Rapid Cycle Adsorption Pump for CO2 Compression**
TFAWS18-IN-12
Lisa Erickson and Anthony Iannetti

14:15 – 14:45 **Automatic creation of reduced-order models using Thermal Desktop**
TFAWS18-IN-07
Derek Hengeveld

14:45 – 15:15 **Modeling Multi-Parameters Radiation in Porous metal Via Machine Learning**
TFAWS18-IN-15
Hyun Hee Kang and Shima Hajimirza

15:15 – 15:30 **Break**

15:30 – 16:00 **Thermal Fluid Model Development of Steam Methane Reformer using Artificial Neural Network**
TFAWS18-IN-01
M. A. Rafe Biswas and Kamwana Mwara

16:00 – 16:30 **Integrated Thermal Vacuum Testing of the Solar Array Cooling System for Parker Solar Probe**
TFAWS18-IN-05
Carl Ercol, Elisabeth Abel, Allan Holtzman, and Eric Wallis

16:30 – 17:00 **Candidate Benchmark Problems for Active and Passive Thermal Software**
TFAWS18-IN-18
Douglas Bell

Passive Thermal Paper Session I

Location: Spinnaker Conference Room, Time: 8:00AM-11:15AM

Session Chair: Ruth Amundsen (LaRC) & Kaitlin Liles (LaRC)

8:00 – 8:30 **Influence of Lunar Rover on Lunar Surface Temperature**
TFAWS18-PT-01
Christopher Pye, Jean-Frederic Ruel, and Josh Newman

8:30 – 9:00 **Analysis of On-Orbit Thermal Performance of the Bigelow Expandable Activity Module (BEAM)**
TFAWS18-PT-03
Zaida Hernandez

9:00 – 9:30 **Thermal Systems Modeling of a Variable Emittance Coating for Human Spacecraft Applications**
TFAWS18-PT-10
Sydney Taylor, Christopher Massina, and Liping Wang

9:30 – 10:00 **LHP Wick Fabrication via Additive Manufacturing**
TFAWS18-PT-04
Bradley Richard

10:00 – 10:15 **Break**

10:15 – 10:45 **A Review of SAGE III on ISS Flight Thermal Data**
TFAWS18-PT-07
Kaitlin Liles, Ruth Amundsen, and Warren Davis

10:45 – 11:15 **Thermal Analysis of Propulsion Components for Europa Clipper Mission**
TFAWS18-PT-19
Heather Bradshaw

Passive Thermal Paper Session II

Location: Spinnaker Conference Room, Time: 8:00AM-11:45AM

Session Chair: Ruth Amundsen (LaRC) & Kaitlin Liles (LaRC)

8:00 – 8:30 **Optimization of Thin-Film Solar Cells for Lunar Surface Operations**
TFAWS18-PT-18
William Johnson

8:30 – 9:00 **Thermal Design, Analysis, and Thermal Vacuum Testing of a 3U CubeSat, CeREs**
TFAWS18-PT-17
Sergio Guerrero

9:00 – 9:30 **Verification of the In-House Developed Simulator Software for Communication Satellite**
TFAWS18-PT-16
Anil Aksu and Hilmi Sundu

9:30 – 10:00 **Thermal Analysis and Design of an S-Band Helical Antenna for LEO Satellites**
TFAWS18-PT-13
Sonia Botta, Nahuel Castello, Juan Andres Breme, and Cristobal Gerez

10:00 – 10:15 **Break**

10:15 – 10:45 **Characterization of Radiation Heat Transfer in High Temperature Structural Test Fixtures**
TFAWS18-PT-14
Larry Hudson, Gus Kendrick, Jessica Kenny, Chris Kostyk, Shelby Pfeifer, Tim Risch, and Megan Waller

10:45 – 11:15 **International Space Station Passive Thermal Control System, Top Ten Lessons-Learned**
TFAWS18-PT-08
John Iovine

11:15 – 11:45 **Transient Heater Analysis for Orion Thermal Vacuum Testing**
TFAWS18-PT-20
Jarred Wilhite and Eric Stalcup

Passive Thermal Paper Session III

Location: Spinnaker Conference Room, Time: 1:15PM-3:15PM

Session Chair: Ruth Amundsen (LaRC) & Kaitlin Liles (LaRC)
Location: Spinnaker Conference Room

13:15 – 13:45 **Constant Conductance Heat Pipe Modeling in Siemens Simcenter and Correlation with JPL SWOT Mission Two-Phase Testbed**
TFAWS18-PT-05
Lina Maricic, Louis Tse, and Ruwan Somawardhana

13:45 – 14:15 **MLI Blanket Performance: Analytical Predictions and Quantitative Trends Measured in Testing**
TFAWS18-PT-06
Tyler Schmidt, Pradeep Bhandari, and Hared Ochoa

14:15 – 14:45 **Infrared Microscopy-Based Thermal Characterization of Lithium-Ion Battery Electrodes**
TFAWS18-PT-11
Rajath Kantharaj, Yexin Sun, and Amy Marconnet

14:45 – 15:15 **Assessment of the Mars Helicopter Thermal Design Sensitivities Using the Veritrek Software**
TFAWS18-PT-12
Stefano Cappucci, Michael T. Pauken, Jacob Moulton, and Derek Hengeveld

JWST Thermal Analysis and Thermal Vacuum Discussion

Location: Clipper Conference Room, Time: 1:15PM-4:30PM

Moderator: Daniel Nguyen (GSFC)

This is an ITAR/Export Control Restricted Session

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Overview of Test Planning, Preparations, and Conduct of the James Webb Space Telescope Combined Optical Telescope Element and Integrated Science Instrument Module (OTIS) Thermal Vacuum/Thermal Balance Test in the JSC Chamber A

Topic List

13:15 – 14:00	**OTIS description and test objectives, ISIM and OTE precursor testing.**
14:00 – 14:45	**Chamber A capabilities and modifications to complete thermal vacuum testing.**
14:45 – 15:00	**Break**
15:00 – 15:45	**Highly specialized GSE required for JWST verification testing.**
15:45 – 16:30	**Test result, hurricane Harvey impacts, and lessons learned.**