

Message from the General Chair

A Renewed Commitment for Space Exploration

Welcome to the 23rd Space Simulation Conference. In the ever-changing world of aerospace testing, we continually face new challenges. It is the goal of this conference to better equip you to meet those challenges. These are exciting times to be involved in the space industry. Numerous missions to explore our solar system are ongoing and many others are planned. Space-based telescopes and deep space probes are providing us with incredible imagery. Spacecraft are currently orbiting Mars as rovers roam the planet's surface searching for evidence of life. And now, with a renewed commitment to space exploration, we anxiously anticipate the challenges ahead. As we all know, mission success for these future missions will demand a well planned and well executed environmental test program.

The 23rd Space Simulation Conference will provide tutorials and a wide variety of papers that present information on recent developments and test activities in the world of space simulation testing. Whether you work in government service, academia, or the corporate arena, I believe that you will find our program interesting and informative.

This year, we are honored to have three distinguished keynote speakers from NASA's Goddard Space Flight Center. Phil Sabelhaus serves as the Manager of the James Webb Space Telescope (JWST) Project. Dr. David Smith is the Head of the Laboratory for Terrestrial Physics and is the Principal Investigator for the Laser Altimeter instrument (MOLA) on the Mars Global Surveyor Spacecraft, and Frank Cepollina serves as manager of NASA's Hubble Space Telescope Development Project.

As in years past, we are pleased to have in attendance top vendors who supply our industry with the latest in technologically advanced products, equipment, and facilities. Please take the time to visit the vendors' tabletop displays and thank them for their participation in the conference.

I would like to take this opportunity to thank two vendors in particular, XL Technology Systems and DynaVac, for their generosity. XL Technology Systems will be hosting our conference reception at the National Aquarium in Baltimore on Tuesday evening, November 9th. Please join us for a delightful evening of scrumptious hor d'oeuvres while socializing with the other attendees and their guests in this spectacular venue. DynaVac will provide luxury motorcoach transportation from Annapolis to the Aquarium.

Finally, I want to thank those of you who made this conference possible. Thank you to all of our speakers and authors for your efforts to provide high-quality papers and presentations. A great big thank you goes to the technical program committee and conference management committee. Without their help this conference would not have been possible. Most of all I want to thank and acknowledge our technical program chair, Bob Tomkiewicz, for all his hard work in organizing the program. Thanks to our previous chairmen, Terry Fisher and John Hazen, for their counsel and assistance. Thanks to Hal Fox, our publicity chair, for all his support with the conference web site and program publication, and thanks to Bill Wilkinson and Nabil Copty who have provided an excellent tutorial program.

Welcome and enjoy the conference.

William N. Breeden III
General Chair

Hotel and IEST Information

Hotel contact number: (410) 224-3150

IEST contact number: (847) 255-1561

TUTORIALS
Monday, November 8, 2004

- 7:30 AM **Registration**
- 8:10 AM **Introduction**
- Co-Chair: William O. Wilkinson*
The Johns Hopkins University
Applied Physics Laboratory
- Co-Chair: Nabil Coptly*
ManTech/NSI
- 8:15 AM **Session 1**
Spacecraft Alignment Techniques
- 9:40 AM **Session 2**
The Future Direction of Vibration Testing
- 1:15 PM **Session 3**
Techniques for Verification of Contamination Control
- 3:00 PM **Session 4**
Engineering for Thermal/Vacuum Test Operations
- 4:30 PM **Tutorial Sessions End**

6:30 PM *Joint Reception with the IEST
Fall Conference*

The joint Welcome Reception will be Monday evening in the Arundel C Ballroom with the vendor exhibits. We plan on hors d'oeuvres, cash bar, and a chance to visit the vendor exhibits.

TUTORIAL DESCRIPTION

Session 1 - Spacecraft Alignment Techniques

Instructor: Carlos G. Aviado

Senior Optics Engineer

ManTech International Corporation at GSFC

A short course on alignment techniques with an introduction to photogrammetry as used in the analysis of complex structure deformation during real-time thermal/vacuum testing. Course will include camera selection, placement geometry, target placement. Data bundling, target maps, data analysis, and test reporting will also be discussed.

Session 2 - The Future Direction of Vibration Testing (Panel Session)

Moderator: Don Hershfeld

Senior Mechanical Engineer

ManTech International Corporation at GSFC

Panelists: Terry Sharton (former JPL, now private consultant); Brian Ross, GSFC; and Tony Keller, Spectral Dynamics

We continue to conduct vibration tests the same way that we have been doing them for years, even though our technology has advanced greatly. Join Mr. Hershfeld in discussing several challenging problems, applying new technologies and resourceful solutions in the art and science of vibration testing.

Interactive Panel Session with distinguished panel members.

Session 3 - Techniques for Verification of Contamination Control (Panel Session)

Moderator: Patrick Hogue
Senior Contamination Engineer
The Johns Hopkins University
Applied Physics Laboratory

Proven and efficient techniques for precision cleaning and cleanliness verification for aerospace contamination control will be discussed. New cleanroom monitoring technologies such as surface acoustic wave (SAW) to measure nonvolatile residue deposition rates, solid phase micro-extraction (SPME) to measure purge gas purity, and automated optical inspection (AOI) to measure percent area coverage on wafers and Gel-Paks will also be presented. Interactive Panel Session with distinguished panel members.

Session 4 - Engineering for Thermal/Vacuum Test Operations

Instructor: Andy Webb
Senior Facility Engineer
The Johns Hopkins University
Applied Physics Laboratory

A short course on the math and science used in everyday operation of a Thermal/Vacuum Test Facility. Most of us in T/V testing have developed a sense of what works and what doesn't through related testing experiences. Engineers and technicians can learn to make educated decisions when designing or troubleshooting thermal vacuum issues through the application of practical math and physics and an understanding of how these relate to the test application or problem.

***Question & Answer Discussions
to Follow Each Session***

RECEPTION AT NATIONAL AQUARIUM

Please join us at our conference reception on Tuesday evening, November 9th, for a delightful evening of scrumptious hors d'oeuvres while socializing with the attendees and their guests at the National Aquarium in Baltimore. It's a water wonderland showcasing a stunning variety of aquatic creatures while teaching visitors how best to preserve their homes.



Believe it or not, you can tour the tidewaters of Maryland, the Pacific coastland, or a tropical rainforest without leaving Baltimore. Or go deeper and deeper through the Atlantic coral reef into the open ocean, observing numerous species of fish and the sharks that swim at the lowest depths.

In addition to well-designed permanent exhibits, dolphins wave, jump, and flip in regularly scheduled shows at the Marine Mammal Pavilion. Catch an underwater view from the atrium below or watch the tricks from the stands, but be warned: The bleachers marked Splash Zone really are splash zones.

The National Aquarium is devoted to conservation. Put your loose change in one of the strategically placed converted parking meters to help preserve the Amazon rain forest and the Atlantic coral reef.

*The conference management team would like to express their appreciation to **XL Technology Systems** for hosting this outstanding event and to **DynaVac** for supplying the transportation from Annapolis to the Aquarium.*



CONFERENCE
Tuesday, November 9, 2004

- 7:30 AM **Registration**
- 8:30 AM **Welcome - Conference General
Chair**
William N. Breeden III
Lockheed Martin Space Systems Co.
- 8:40 AM **Welcome - President IEST**
Jan Eudy
- 8:45 AM **Keynote Speaker**
Phil Sabelhaus
NASA Project Manager
James Webb Space Telescope
- 9:25 AM **Welcome - Technical Program
Chair**
Bob Tomkiewicz
The Johns Hopkins University
Applied Physics Laboratory

SESSION 1 - DYNAMICS TESTING

Chair: Raj Singhal, Canadian Space Agency
Co-Chair: Elie Choueiry, Canadian Space Agency

- 9:30 AM **Upgrade of the Goddard Space
Flight Center's Mass Properties
Measuring System**
Brian P. Ross, Christopher McLeod
- NASA Goddard Space Flight Center
- 9:55 AM **Feasibility of Force Limited Vi-
bration Testing of Components**
R. Foss - Lockheed Martin Astronautics
- 10:20 AM **Coffee Break - Visit Vendor
Booths**
- 10:50 AM **Mass Properties Testing of the
Mars Exploration Rovers**
*Jason Greene - Lockheed Martin
Space Systems*
- 11:15 AM **Satellite Testing Keys: Accurate
Sine Testing with Tracking Fil-
ters and Notching**
*Gary Marraccini - Spectral Dynamics,
Inc.*
- 11:40 AM **Lunch (on your own)**

SESSION 2 - NEW CAPABILITIES AND FACILITIES - 1

- Chair: Ed Packard, NASA Goddard Space Flight Center*
- Co-Chair: Nabil Copty, ManTech Aerospace*
- 1:05 PM **State of the Art Multi-Functional Dynamics Test Facility**
Jason Yocum - Spectrum Astro
- 1:30 PM **New ESA EMC Test Facility MAXWELL**
Alexandre Popovitch, J. L. Suchail-ESA/ESTEC
- 1:55 PM **Goddard Space Flight Center Spacecraft Magnetic Test Facility Restoration Project**
Robert Vernier, Todd Bonalksy, James Slavin - NASA Goddard Space Flight Center
- 2:20 PM **Cryotesting of the James Webb Space Telescope's Integrated Science Instrument Module**
Julie Van Campen - NASA Goddard Space Flight Center
- 2:45 PM **Coffee Break - Visit Vendor Booths**
- 3:10 PM **James Webb Space Telescope (JWST) Integrated Science Instrument Module (ISIM) Cryogenic Component Development Test Facility**
*Edward A. Packard, Christopher S. Skocik, Stuart D. Glazer, Daniel K. Hayward, Julius W. Tolso
NASA Goddard Space Flight Center*
- 3:35 PM **Low Vibration 35" Cryopump**
Ted Kobel - XL Technology Systems, Inc.
- 4.00 PM **Session Ends**
- 4:45 PM **Buses Leave for Conference Reception**

CONFERENCE
Wednesday, November 10, 2004

7:30 AM **Registration**

8:30 AM **Keynote Speaker**

*David E. Smith, Chief, Laboratory for
Terrestrial Physics, NASA Goddard
Space Flight Center*

**SESSION 3 - DATA ACQUISITION AND
ANALYSES**

*Chair: Jim Sisco, NASA Marshall Space
Flight Center*

*Co-Chair: Manfred Dieh, Lockheed Martin
Space Systems Company*

9:15 AM **Goddard Space Flight Center's
Structural Dynamics Data Ac-
quisition System**

*Christopher McLoed - ManTech Aero-
space*

9:40 AM **Remote Control of Equipment
and Processes for Data Acquisi-
tion and Control Systems via the
Internet**

*Atul Patel, Robert Bauer - The Boeing
Company
Integrated Defense Systems*

10:05 AM **Software Design for Large Ther-
mal Vacuum Chamber Control
and Data Acquisition**

*E. Comandatore, P. Giordano, P.
Messidoro - Alenia Spazio S.p.A.; Jim
Fallon, Tim Dense - Lockheed Martin
Space Systems Company*

10:30 AM **Coffee Break - Visit Vendor
Booths**

**SESSION 4 - THERMAL VACUUM
TESTING**

*Chair: Hadi Navid, The Johns Hopkins Uni-
versity Applied Physics Laboratory*

*Co-Chair: Andy Webb, The Johns Hopkins Uni-
versity Applied Physics Laboratory*

- 11:00 AM **The MESSENGER Visible Imager Thermal Design: Preparing for Operation in Orbit Around Mercury**
Bruce Williams - The Johns Hopkins University Applied Physics Laboratory
- 11:25 AM **Swift Observatory Space Simulation Testing**
Mellina Espiritu - NASA Goddard Space Flight Center
- 11:50 AM **Thermal Vacuum Testing of the MESSENGER Spacecraft**
Jack Ercol, The Johns Hopkins University Applied Physics Laboratory

12:15 PM **Lunch (on your own)**

SESSION 5 - NEW CAPABILITIES AND FACILITIES - 2

Chair: Don Benson, Northrop Grumman

Co-Chair: Dave Feick, Northrop Grumman

- 1:45 PM **Electric Thruster Backflux and Other Simulated Space Environment Effects in AEDC's CCOSE Chamber**
Dustin Crider - Arnold Engineering Development Center
- 2:10 PM **Verification and Validation of a Combined Thermal Vibration Facility at the DFL**
*Raj Singhal - Canadian Space Agency
David Florida Laboratory*
- 2:35 PM **Refurbishment of a Large Thermal Vacuum Chamber**
*Raymond J. LeBlanc, Elie Choueiry - Canadian Space Agency
David Florida Laboratory*
- 3:00 PM **Environmental Chamber Area (ECA)**
Manfred Diehl, Alan Merrick - Lockheed Martin Space & Strategic Missiles
- 3:25 PM **Coffee Break - Visit Vendor Booths**

3:50 PM **Design, Integration, and Test of Spectrum Astro's Thermal Vacuum Chamber**

Daniel Corral - Spectrum Astro

4:15 PM **Session Ends**

5:30–7:00 PM *Networking Party in Arundel Ballroom*

The Networking Party will be Wednesday evening in the Arundel C Ballroom with the Vendor exhibits. We plan on hors d'oeuvres, cash bar, and a chance to visit the vendor exhibits.

Thursday, November 11, 2004

7:30 AM **Registration**

8:15 AM **Keynote Speaker**

Frank Cepollina, Manager, Hubble Space Telescope Development Project, NASA Goddard Space Flight Center

SESSION 6 - CONTAMINATION

Chair: Dave Cornog, Boeing

Co-Chair: Patricia A. Hansen, NASA Goddard Space Flight Center

9:00 AM **Lessons Learned from the Hubble Space Telescope (HST) Contamination Control Program**

Patricia A. Hansen, Jacqueline A. Townsend, Randy Hedgeland - NASA Goddard Space Flight Center

9:25 AM **The Swift Project Contamination Control Program: A Managed-Risk Approach for Achieving On-Orbit Performance Requirements**

Patricia A. Hansen, Diane T. Day, Mark S. Secunda, Glenn P. Rosecrans - NASA Goddard Space Flight Center

9:50 AM **QCM Thermo-Gravimetric Analysis (TGA) Comparisons**

Glenn Rosecrans, George Meadows - Swales Aerospace, Inc.

- 10:15 AM **Coffee Break**
10:30 AM **Evaluation of Particulate Generation from Disposable Cleanroom Garments**
Monali B. Joshi, Raymond J. LeVesque II - Swales Aerospace, Inc.

SESSION 7 - SIMULATIONS AND SPECIAL TOPICS

- Chair: Otto Brunner, ESA/ESTEC*
Co-Chair: Bob Tomkiewicz, The Johns Hopkins University, Applied Physics Laboratory
- 10:55 AM **New Force Measurement Device for ARIANE 5 Payloads**
Otto Brunner, Francesco Ratti-ESA/ESTEC
- 11:20 AM **Environmental Test Program for the Mars Exploration Rover Project**
Terry C. Fisher - California Institute of Technology Jet Propulsion Laboratory
- 11:45 AM **SUV Rollover Test**
William Chambers - ManTech Aerospace
- 12:10 PM **HTEST: A Configurable Triggered Data System for Simulating Space System Data Source Integration**
Kara L. Nance, Brian Hay, Mark Lisee - Department of Mathematical Sciences, University of Alaska Fairbanks
- 12:35 PM **Vacuum/Zero Net-Gravity Application for On-Orbit TPS Tile Repair**
Emilie J. Siochi, Donald H. Humes, Gale A. Harvey - NASA Langley Research Center
- 1:00 PM **Session-Technical Program Ends**

SPEAKER INFORMATION

Phil Sabelhaus - Keynote Speaker, Tuesday



Phil Sabelhaus serves as the Manager of the James Webb Space Telescope (JWST) Project at NASA's Goddard Space Flight Center. The JWST project is responsible for the development, launch, operations, and science data processing for the 21st century follow-on of the highly successful Hubble Space Telescope.

Phil has over 20 years of distinguished experience at NASA. Over this time, he has served as the Thermosphere, Ionosphere, Mesosphere, Energetics and Dynamics (TIMED) Deputy Project Manager, the total Ozone Mapping Spectrometer (TOMS) Project Manager, the Geostationary Operational Environmental Satellites (GOES) Deputy Project Manager, and the Landsat 7 Project Manager. In late 1998, Phil was appointed the Deputy Associate Director of Flight Projects for EOS Development. As part of these duties, he served as the ESSP VCL Project Manager and the EOS Aqua Project Manager. In September 2001, Mr. Sabelhaus was appointed the Associate Director of Flight Projects for EOS. Phil graduated from the University of Maryland with a B.S. in Mechanical Engineering.

The JWST project is currently in phase B with its launch scheduled for August 2011. The project is a partnership between NASA, ESA, and CSA. The U.S. JWST team is in place with the selection of Northrop Grumman Space Technology (NGST) as the prime contractor for the telescope and the Space Telescope Science Institute (STScI) as the mission operations and science data processing lead.

As our Tuesday keynote speaker, Phil will provide an overview of the planned JWST science, current architecture, and mission status, including technology developments and risks.

David E. Smith - Keynote Speaker, Wednesday



Dr. David Smith is the Head of the Laboratory for Terrestrial Physics at Goddard Space Flight Center and was educated at the Universities of Durham and London in England in mathematics and space geophysics. David is the Principal Investigator

for the Laser Altimeter instrument (MOLA) on the Mars Global Surveyor Spacecraft currently operating at Mars, a Co-Investigator responsible for gravity and laser altimetry on the MESSENGER mission to Mercury due for launch this May, and a Co-Investigator on the Dawn mission to the asteroids Vesta and Ceres. He was also a member of the Science Team for the Lunar Clementine mission.

As our Wednesday keynote speaker, David will provide an overview of the Lunar Reconnaissance Enabling Exploration.

Frank Cepollina - Keynote Speaker, Thursday



As head of NASA's Hubble Space Telescope Development Project, Mr. Frank Cepollina is responsible for the development and installation of all the new science instruments and hardware that keep Hubble on the cutting edge.

His distinguished career includes work on NASA's first serviceable Multimission Modular Spacecraft, the Explorer Platform, and serving as Project Manager for the Solar Maximum Repair Mission. Mr. Cepollina directed the design of the generic servicing platforms and instrument carriers that would be used on Hubble and many other NASA spacecraft. He has been involved in designing Hubble's astronaut interfaces and power tools since the inception of the Shuttle Program.

As our Thursday keynote speaker, Frank will discuss the benefits of satellite servicing, particularly with regard to Hubble.

MEETING MANAGEMENT COMMITTEE

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Lockheed Martin Space Systems Company-
Denver*

Technical Program Chair

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The Johns Hopkins University
Applied Physics Laboratory*

Tutorial Co-Chair

*William O. Wilkinson
The Johns Hopkins University
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Tutorial Co-Chair

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