

2005 JANNAF CS, APS, PSHS, MSS Meeting Held in Charleston

The 40th JANNAF Combustion Subcommittee (CS) Meeting, the 28th JANNAF Airbreathing Propulsion Subcommittee (APS) Meeting, the 22nd JANNAF Propulsion Systems Hazards Subcommittee (PSHS) Meeting, and the 4th JANNAF Modeling & Simulation Subcommittee (MSS) Meetings were jointly held during the week of 13-17 June 2005 at the Charleston Area Convention Center and the Charleston Air Force Base, Charleston, So. Carolina. Dr. Unmeel Mehta of NASA Ames Research Center, Moffett Field, Calif. served as the joint Meeting Chairman. Approximately 400 scientists, engineers, and managers attended the meeting with a total of 211 papers presented in 45 technical sessions, representing fewer attendees and papers than the 2003 Meeting in Colorado Springs, Colorado, but on the order of previous meetings. The unusual growth at the Colorado Springs Meeting included APS sessions on NASA's Next Generation Launch Technology, the Columbia Accident Investigation, CS/PSHS sessions on Hydrogen Peroxide technology and the continued the growth of APS and MSS participation in general.

The meeting opened with a most interesting keynote presentation by Ms. Natalie W. Crawford, Vice President and Director Project AIR FORCE RAND. Her presentation, in a sense, was on "*Where Hhas Our R&D Gone Wrong and How Can We Do Better?*" Ms. Crawford intrigued the attendees with her special insight and perspectives on the historical progress of U.S. propulsion R&D and offered her assistance to enhance our progress, venturing the following thought: "You fill my quiver with arrows, and I'll shoot them for you." Ms. Crawford highlighted the importance of propulsion, the advances needed in the future, the investments and the choices that we'll face, and she urged us to go for the next frontier.

Opening ceremonies also included presentation of awards for outstanding sustained contributions to JANNAF. The Combustion Subcommittee award for outstanding sustained contribution was presented to Ms. Susan Peters, of the NSWC, Indian Head, Maryland, and Dr. Robert L. Geisler, Consultant from Tehachapi, Calif. and formerly of AFRL, Edwards, AFB. Certificate of Appreciation awards were also given to Dr. Christine M. Walsh and Dr. Barrie E. Homan, both of NSWC, Indian Head, MD for their contributions to the CS Propellant Burning Rate Control and Tailoring Panel. Airbreathing Propulsion Subcommittee awards for sustained contribution were presented to Dr. Wallace Chinitz, ATK GASL, Ronkonkoma, New York, and Dr. Stan Powell, Aerospace Testing Alliance, Arnold AFB, Tenn. Additionally, 16 members of the APS, Engine Test and Validation panel were recognized with Certificate of Appreciation awards for their contributions to release a 2nd Edition of CPIA Publication 710, *Scramjet Propulsion Testing Standards, Recommended Practices and Guidelines*. Their certificates will be sent to their supervisors for presentation. A Propulsion Systems Hazards Subcommittee recognition award was presented to Dr. Anita M. Renlund, of Sandia National Laboratories, for her leadership and technical contributions to the PSHS Cookoff Panel. Finally, the Modeling and Simulation Subcommittee awarded a Certificate of Appreciation to Ronald S. Fry, JHU/CPIA, Maryland, for his contributions to the beginnings of the MSS over its first three years of operation. The Executive Committee presented Ms. Dottie Becker, JHU/CPIA, with a JANNAF Recognition and Appreciation award for her many years of devoted service.

The CS technical program included presentation of 76 technical papers in 15 technical sessions sponsored by the CS with an additional 8 papers in one session cosponsored with the APS and MSS. The CS technical sessions covered the following topics: enhanced blast phenomenology, modeling, diagnostics, formulation evaluation and testing; gun propellant characterization; gun interior ballistics; electro-thermal chemical guns; experimentation with guns and gun

components; kinetics, combustion and stability of solid propellants; propellant combustion modeling; metal combustion; combustion diagnostics; combustion, ignition and kinetics of liquid and novel propellants; and IHPRPT solid rocket motor modeling and simulation. The jointly sponsored session covered scramjet combustion and component modeling and simulation. A joint CS/APS workshop was conducted on "Prediction and Measurement of Lean Blowout in Scramjet Combustors."

Meetings of all current CS technical panels were held during the week. The Kinetics Panel is continuing to examine solid phase kinetics in connection with new high nitrogen content compounds, and potential new IM programs. The panel is planning a new workshop in early 2006 on new propellant ingredients. The Propellant Burning Rate Panel is continuing to collaborate with the Propellant Development & Characterization Subcommittee on the population of an electronic propellant database. Three future workshops are planned for 2006 on "Novel Ingredients & Formulations for Gun Propellants," "Closed Bomb Burning Rate Methods," and "Need for Small and medium Caliber Gun Modeling." The Flowfield Diagnostics Panel held a specialist session at this meeting to review critical issues and identify future activities.

The APS technical program included presentation of 70 technical papers in 14 technical sessions sponsored by the APS with an additional 8 papers in one session cosponsored with the CS and MSS. The technical sessions covered airbreathing propulsion testing; scramjet ignition and fuels; advanced and combined cycle propulsion technology; hypersonic technology overviews; X-43A overviews and hypersonic lessons learned; many sessions on X-43A propulsion prediction and results, aerodynamics and performance, structures, guidance, navigation and control; revolutionary turbine accelerator technologies; hypersonic vehicle structures, components, and materials; scramjet integration, shape and scaling; and variable flow ducted rocket technology. The jointly sponsored session covered scramjet combustion and component modeling and simulation.

Meetings of all current APS technical panels were held during the week. The APS Engine Test & Validation Panel is very busy developing practices and standards for scramjet engine testing, summarized in the 2nd Ed Pub 710, to be released this fall. The Component Level and Physical Modeling Panel conducted a workshop jointly with the CS on "Prediction and Measurement of Lean Blowout in Scramjet Combustors," to guide future panel activities. The Structures and Materials Panel is continuing efforts to identify SOA in non-metallic high temperature materials (two papers were given at this meeting), identify a technology roadmap for developments and identify existing and needed test facilities. The Fuels Panel is investigating joint activities with CS and new Liquid Propulsion Subcommittee involving the kinetics of liquid hydrocarbon fuels. The Advanced Engine Cycle Panel is investigating: i) developing standard engine test reference cases to validate analysis codes; ii) a possible workshop to understand our ability to predict dynamic characteristic responses of engines; and, iii) reconciling the many airframe-engine force accounting systems that companies seem to be using. Finally, the Active Combustion Control Panel is being reconstituted with new leadership and viable tasks and participants are being identified.

The APS conducted two additional workshops on "Pulse Detonation Combustion for Propulsion," and "Scaling Laws for Hypersonic Aerospace Systems – Workshop II." A topic of some interest for a future APS workshop was identified as "Should Flight Testing Be Made Part of an Engine Development Program?"

The PSHS technical program included presentation of 43 technical papers in seven sessions covering decomposition, ignition and combustion processes; characterizing violence of reaction

to cookoff; testing, modeling and mitigation of impact; the vulnerability of solid gun propellants; violent reaction and detonation; and various safety, hazard classification and insensitive munitions topics. The number of papers presented represented an increase of about 20% from the previous meeting in December, 2003.

Meetings of all current PSHS technical panels were also held during the week. The Safety & Hazard Classification Panel focused on the ongoing harmonization of Insensitive Munitions (IM) and Hazard Classification testing. Representatives from each Service and the DDESB spoke about each organization's efforts to promote such harmonization, and the resulting savings of test assets, whenever practical. Dr. Josephine Covino of the DDESB updated the panel on activities within the NATO community to formalize testing harmonization within the applicable NATO Standard Agreements (STANAGS). The Services agreed that harmonization of testing is occurring, where appropriate, although no official requirements exist. The Cookoff Panel discussed plans to complete the documentation of the Navy-DOE cooperative effort on slow cookoff, and reviewed ongoing cookoff-related activities at government, industry and university facilities. A recent shift in the community's focus from slow cookoff to fast cookoff was evident during this review. Several panel members suggested the need for more participation in international forums dealing with cookoff issues, and increased efforts to report international activities to the JANNAF membership. Finally, the PSHS Impact/Shock Induced Reactions Panel refocused their efforts on impact hazards modeling. JANNAF's potential role in providing guidance to DoD efforts in this area was discussed. Tentative plans were made for a workshop to discuss what the role of this panel, and the broader JANNAF modeling and simulation community should be.

The MSS technical program included presentation of 14 papers in 4 sessions, with an additional 8 papers in one session cosponsored with APS and CS, and 16 presentations in two specialist sessions. The technical sessions covered system integration, virtual engineering and integrated health management. The first specialist sessions focused on verification, validation and accreditation, and included valuable overviews of ongoing DoD, Army, Navy and NASA efforts in the field. The second specialist session brought together modeling and simulation vendors from across the country, to discuss current and emerging simulation capabilities, including:

- Astrox Corporation
- Phoenix Integration
- Technosoft Incorporated
- Wolverine Ventures
- SRS Technologies
- Software and Engineering Associates
- Abaqus Incorporated
- Fluent Incorporated
- MSC Software

The MSS also held a workshop entitled Engineering of Complex Systems, designed to establish a vision on the subject for the 21st century, and identify current obstacles and near term joint activities. The MSS Panels also met to review progress on activities, engage the MSS community and identify future tasks.

JANNAF continues to be effective in addressing problems of mutual interest to the government, industry and academia. Fruitful meetings of current CS, APS, PSHS, and MSS Technical Steering Groups were held throughout the week, contributing to the future direction of your

technical activities. Overall, the meeting was judged to be a success by the participants and stands witness to the continuing health of the propulsion industry.

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