



JANNAF INTERAGENCY PROPULSION COMMITTEE JOINT ARMY-NAVY-NASA-AIR FORCE

ANNOUNCEMENT & CALL FOR PAPERS

52nd Combustion (CS)

40th Airbreathing Propulsion (APS)

40th Exhaust Plume & Signatures (EPSS)

34th Energetic Systems Hazards (ESHS)

JOINT SUBCOMMITTEE MEETING

Programmatic & Industrial Base Meeting (PIB)

4-8 DECEMBER 2023 // SALT LAKE CITY, UTAH

Abstract Deadline: 9 June 2023



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The December 2023 meeting of the Joint Army-Navy-NASA-Air Force (JANNAF) will consist of the Joint Meeting of the 52nd Combustion / 40th Airbreathing Propulsion / 40th Exhaust Plume and Signatures / 34th Energetic Systems Hazards Subcommittees along with a meeting of the Programmatic and Industrial Base. Dr. Heather F. Hayden with the Naval Surface Warfare Center-Indian Head Division at Indian Head, MD, is the Meeting Chair. This meeting will be held **Monday through Friday, 4 - 8 December 2023**, at the **Hilton Salt Lake City Center**, and the **Draper Headquarters of the Utah National Guard**. Please refer to page 5 for hotel and area information.

ATTENDANCE REQUIREMENTS

The overall security level of the meeting is **Secret**. Unclassified sessions will be held at Hilton Salt Lake City Center in Salt Lake City; classified sessions will be hosted by the Draper Headquarters of the Utah National Guard, approximately a 20 minute drive from the hotel. Attendance, applicable to presenters as well, is restricted to U.S. citizens qualified to receive unclassified, limited-distribution information. *No foreign nationals are permitted to attend.*

ALL non-government attendees (which includes contractors, consultants and universities) attending this meeting **must**:

1. Be working on a current government contract or certified by a Sponsoring Government Official
2. Provide their organization's DD 2345 Certification Number for receipt of militarily-critical technical data

JCP / DLA / DD2345 Certification Number: For additional information, contact the Joint Certification Program Office (JCP) at 1-800-352-3572 or visit their Web site at <https://www.dla.mil/HQ/LogisticsOperations/Services/JCP/>.

To attend the classified sessions, attendees must also possess a personal security clearance of at least Secret with a need-to-know in the areas of rocket, missile, space, aircraft, or gun propulsion.

ALL Attendees: To register, you must first have a JANNAF Secure Portal account (registration pre-requisite). Please visit the [Registration Steps](#) page of the meeting website for additional information and important links. All presenters are required to register and pay the registration fee.

University Participants: Students and professors must meet additional requirements, as outlined on the [University Registration Information](#) page of the December meeting website.

Questions concerning attendance eligibility should be directed to the JANNAF Security Team, Mionna Sharp (msharp@erg.jhu.edu) or Mary Gannaway (mgannaway@erg.jhu.edu) or by calling (410) 992-7300.

REGISTRATION

Registration will open in approximately mid-September. Preliminary information is provided on the [December meeting website](#) with full details available when registration opens.

PURPOSE

The JANNAF Interagency Propulsion Committee focuses on the technology, development, and production capabilities for all types of propulsion systems and energetics for tactical, strategic and missile defense rockets and missiles, for space boost and orbit transfer, for in-space propulsion, and for gun systems. JANNAF provides a forum for discussion of propulsion issues, challenges, and opportunities across the Military Departments, Defense Agencies and NASA. JANNAF subcommittees focus their resources on technical issues of interest to the JANNAF agencies.

Work in all areas of DoD and NASA are solicited as defined below:

6.1 Basic Research:

Systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products.

6.2 Applied Research:

Systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

6.3 Development:

Systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

JANNAF accepts papers that are unclassified/unlimited and unclassified/limited for all meetings; and up to classified Secret as announced in the specific meeting's announcement and call for papers.

SCOPE

To learn more about the scope of the standing JANNAF subcommittees at this meeting, please review the information provided below and on pages 6 - 15.

Combustion Subcommittee

The Combustion Subcommittee (CS) covers analytical modeling and experimental research on chemical combustion phenomena for solid, liquid, hybrid, and airbreathing missile, space, underwater, and gun propulsion systems.

Airbreathing Propulsion Subcommittee

The Airbreathing Propulsion Subcommittee (APS) addresses technical problems and issues associated with turbojet, ramjet, scramjet, and combined- or mixed-cycle engines.

Exhaust Plume and Signatures Subcommittee

The technologies of concern to the Exhaust Plume and Signatures Subcommittee (EPSS) involve phenomena associated with exhaust plumes from rockets, ramjets, space, and gun propulsion systems as well as wakes and hypersonic flows. These phenomena can be divided into three technical areas: plume/wake/hypersonic flowfields, plume/wake/hypersonic signatures (to include electro-optical [EO], infrared [IR], and radio frequency [RF] radiation), and a broad area incorporating other plume/wake/hypersonic effects.

In addition, the EPSS Signatures panel promotes technical interchange among members of the Electro-Optical/Infrared (EO/IR) aircraft/missile signature community from both government and industry.

Energetic Systems Hazards Subcommittee

The Energetic Systems Hazards Subcommittee (ESHS) is concerned with hazards associated with energetic systems and how these vulnerabilities might degrade system performance and lethality. Included in this scope are hazard analyses for tactical and strategic missiles; small, medium, and large caliber gun systems; solid and liquid propellant systems; hazards encountered during loading and firing operations; and key technology areas identified from hazard analyses. Additionally, ESHS is involved with the development, standardization and application of meaningful computational / experimental methods for assessing vulnerability and performance of the energetic materials found in propulsion systems and munitions. Finally, the subcommittee is concerned with the identification and solution development for interagency problems associated with energetic system vulnerability and performance, the coordination of interagency sponsored programs, the establishment of nomenclature, and the promotion of technical information and data exchange.

Programmatic and Industrial Base Meeting

The JANNAF Programmatic and Industrial Base (PIB) Committee was created with the approval of the JANNAF Charter by the Department of Defense and the National Aeronautics and Space Administration in 2014. Its focus is on providing a mechanism for DoD and NASA to collaboratively identify and manage risks and issues within the propulsion industrial base, and to work together to solve them. This requires an integrated understanding of each program's plans and key decision points, and how those decisions may impact the propulsion industrial base. PIB areas of interest include integrated program plans and key decision points; industrial base assessments; risks and opportunities with respect to skills, knowledge, and experience; identification of commonality, innovative acquisition, and partnership opportunities; integrated assessments to identify rocket propulsion industrial base (RPIB) rationalization opportunities; special actions from senior agency, department, or Executive Office of the President (EOP) leadership; and information provided to decision makers for either situational awareness or policy decisions.

Some top reasons given for attending JANNAF meetings:

- The opportunity to present limited distribution papers to a technical audience and collaborate with colleagues from other laboratories and companies.
- Networking opportunities with other scientists.
- Lessons learned presentations.
- Keeping up with changing technology.
- Wide variety of subjects.
- Great exposure to the industry for early career professionals.

ABSTRACT SUBMITTAL GUIDANCE

- The technical areas to be addressed are defined in this announcement. Individuals who wish to submit an abstract should carefully review the topic areas listed on pages 6 - 15.
- Remember, ***you must be a qualified U.S. Citizen to attend and present at this meeting.*** No foreign nationals are permitted to attend.
- **The deadline date for submission of the online Abstract Form is 9 June 2023.** Please do not submit late without first contacting ERG (meetings@erg.jhu.edu).
- **Many organizations require abstracts to be processed through an approval system prior to submission. This process takes additional time, so authors should plan accordingly in an effort to meet the abstract deadline date.**
- Submitting an abstract represents an agreement to **submit a final paper for publication by 3 November 2023**, attend the meeting, and deliver a 25-minute presentation. The JANNAF Policy of "No Paper, No Podium" will be in effect for this meeting.
- **All abstracts are to be submitted via the JANNAF Abstract Submittal Site.** A JANNAF Portal account is not required to submit an abstract.
- The **content of all abstracts must be unclassified and either distribution statement A** (approved for public release) **or C** (Distribution authorized to U.S. Government and their contractors), regardless of the eventual classification and distribution statement of the paper and presentation.
- **Abstracts will NOT be published** and will only be used by the program committee members for selection and scheduling purposes.
- You will be asked to indicate your **presentation's** anticipated distribution statement when completing required fields on the Abstract Submittal Site. This important information helps the program planning committee to properly place your presentation if accepted.
 - ▷ Dissemination of information from JANNAF presentations is primarily relegated to either Statement A (approved for public release) or Statement C (Distribution authorized to U.S. Government and their contractors).
 - ▷ To properly secure them, presentations marked with Statement B (U.S. Government agencies only), Statement D (U.S. Department of Defense and U.S. DoD Contractors only), or Statement E (U.S. Department of Defense components only), must be placed at the beginning of session agendas.
 - ▷ Papers may have different Distribution Statements than their corresponding presentations.
- The Title field is limited to 150 characters including spaces.
- A maximum of 5 authors may be listed for inclusion in the author list for the Preliminary and Final Programs. You may list more than five authors when submitting your final paper and all names will be included in the author list when the paper is published in JDOC.
- Abstract length is limited to 300 words, and may not include tables or figures. State the objective of the work. Describe the scope, method of approach, and any new advances in the state of the art. Highlight important conclusions, and include a brief summary of the data used to substantiate them.

- Indicate confirmation of required resources when completing the required fields in the online form to ensure availability of time, funding, and support for your participation in the meeting. This is NOT related to security review/approval to submit the abstract or submit/present the paper. A "no" response to this question will place your abstract in placeholder status.
- If the abstract deadline is approaching and you have not received approval to release your abstract, please contact the ERG meetings team (meetings@erg.jhu.edu) for guidance on submitting a placeholder.
- When filling in the form in the Abstract Submittal Site, if there is required information that you do not have, you have the ability to save your form and return once you have obtained the missing information to complete and submit the form.

ABSTRACT SUBMITTAL INSTRUCTIONS

JHU WSE ERG accepts only **electronic submission** of abstracts, presentations, and papers. **Abstracts cannot be submitted via email, and instead must be submitted only via the Abstract Submittal Site.**

1. To access the Abstract Submittal Site, go to: <https://jannaf.org/abstractstart>. You may submit an abstract whether or not you have an active JANNAF Secure Portal Account. A "Help" button is provided at the upper right corner of each page should you require assistance.
 - a. **If you DO NOT have an active JANNAF Secure Portal Account**, click the link, "I do not have a JANNAF Portal account and wish to submit an abstract." Then proceed to step 2 in these instructions.
 - b. **If you have an active JANNAF Secure Portal Account**, click the link, "I have an active JANNAF Portal account and wish to submit an abstract." You will be prompted to log into your account (if you have not already done so), and directed to the Abstract Landing Page. Skip ahead to step 3 in these instructions to continue.
2. After clicking the link indicating that you DO NOT have a JANNAF Portal account, you will be taken to a page prompting you to begin a validation process to ensure the legitimacy of your submission(s).
 - ▷ Select the appropriate meeting (December 2023 CS/APS/EPSS/ESHS/PIB) and complete all required fields. Remember the email address that you have entered, as you will need it for later steps. After completing all fields, click the "Request" button at the bottom of the page. You will be provided instructions to guide you through the remaining validation process.
 - ▷ If you have not received a validation code (from info@erg.jhu.edu) within 30 minutes after you have submitted a request, email meetings@erg.jhu.edu. Be sure to check your junk/spam folder.
 - ▷ You may use your validation code to submit more than one abstract.
3. After reaching the Abstract Landing Page, click the grey "Abstract Submissions" button to create a new abstract or edit/submit a draft abstract.
 - ▷ Once you have reached the Submission Details tab, you will have the option to save the form as a draft and return to complete it at a later time.

4. When all required fields have been completed accurately, submit your abstract. You will have the opportunity to review your responses before you submit.
5. If you would like to edit a draft or submit another abstract, return to <https://jannaf.org/abstractstart>.
 - ▶ **If you DO NOT have an active JANNAF Secure Portal Account**, select the option, “I do not have a JANNAF Portal account but already have a validation code.” Re-enter the email address and validation code that you used previously in order to access these options.
 - ▶ **If you have an active JANNAF Secure Portal Account**, repeat step 1b, and steps 3 – 4.

RECOMMENDATIONS FOR WORKSHOPS OR SPECIALIST SESSIONS

Recommendations for workshops or specialist sessions are solicited at this time. Individuals interested in organizing and chairing a workshop or specialist session should contact the JHU WSE ERG Technical Staff member in their respective subcommittee with suggestions for topics by **9 June 2023**. See page 16 for additional information and requirements.

AWARDS

Nominations for JANNAF Technical Executive Committee (TEC), PIB Executive Committee (PEC), CS, APS, EPSS, and ESHS recognition awards are being solicited. Individuals interested in nominating an award recipient should follow the guidelines and instructions on page 16.

HOTEL & AREA INFORMATION

All unclassified sessions will be conducted at the Hilton Salt Lake City Center in Salt Lake City. The hotel is conveniently located within a short walk of numerous options for dining, sightseeing, entertainment, and shopping. It is also 15 minutes from the Salt Lake City International Airport and 20 minutes from the Draper Headquarters of the Utah National Guard, where classified sessions will be held.

Hotel

Discounted rooms at the Salt Lake City GSA per diem rate in effect at the time of the December meeting (for reference, FY 2023 rate is \$128 per night plus tax) have been arranged for all JANNAF attendees at the Hilton Salt Lake City Center. Any change to this rate for FY 2024 will be posted once announced by the GSA. Please visit the [Hotel](#) page of the website for more information; details will be announced soon.

Transportation

The Salt Lake City International Airport is less than 15 minutes from the hotel. Ground transportation costs between the airport and hotel range from \$2.50 each way for the TRAX/ Light Rail Service to approximately \$26 for Yellow Cab Taxi. Rideshare services and rental cars are also available. More information can be found on the airport's website. Hotel parking information and transportation details if attending classified sessions at the Draper Headquarters of the Utah National Guard will be provided on the meeting website soon.

CS/APS/EPSS/ESHS/PIB AUTHOR TIMELINE

Date	Weeks before Meeting	Action
9 June 2023	25	Deadline for receipt of abstracts via Abstract Submittal Site .
7 Aug 2023	17	Approximate date for Committee decision emails to be sent to authors.
25 Aug 2023	14	Deadline for changes to Meeting Invitation and Preliminary Program.
11 Sep 2023	12	Approximate date for Meeting Invitation, Preliminary Program, and registration links to be posted on meeting website.
29 Sep 2023	9	Deadline for award nominations and submittal of Student papers for Best Student Paper award consideration.
20 Oct 2023	6	Deadline for submission of changes to the Final Program.
3 Nov 2023	4	Deadline for receipt of papers and publication clearance forms. Papers not received by this date may be removed from the program.
3 Nov 2023	4	Deadline for discounted Early registration fee. <i>Regular fee in effect thereafter.</i>
3 Nov 2023	4	Classified sessions only: Deadline to submit Visit Authorization Request (VAR) and Security Clearance Certification Form.
13 Nov 2023	3	Deadline for reservations at Hilton Salt Lake City Center.
17 Nov 2023	2	Deadline for receipt of presentations.
17 Nov 2023	2	Last day to pre-register online - complete both the registration form and payment of registration fee by this date. <i>On-site registration required thereafter (allow extra time on-site).</i>
4 Dec 2023	0	Start date for CS/APS/EPSS/ESHS/PIB Joint Subcommittee Meeting

SUBCOMMITTEES / MISSION AREAS AT THIS MEETING

Click on the Mission Area of interest in the chart below to jump to that section in this Call for Papers.

Mission Area	CS	APS	EPSS	ESHS
I	Ignition and Combustion of Gun Propellants	Turbopropulsion	Plume / Wake / Hypersonic Flowfield Analysis	Thermal Decomposition and Cookoff
II	Solid Propellants and Combustion	Ramjet Propulsion	Plume / Wake / Hypersonic Radiation and Signatures	Shock / Impact-Induced Reactions
III	Explosive Performance / Enhanced Blast	Scramjet Propulsion	Plume / Wake / Hypersonic Effects	Insensitive Munitions Technology
IV	Airbreathing Combustion	Combined / Advanced Cycle Propulsion	Additional Plume / Wake / Hypersonic Topics	Combustion Vulnerability of Stowed Energetics
V	Combustion Diagnostics	Integrated Vehicle Design and Analysis	Composite Scene Signatures of Plume / Wake / Hypersonic Flowfield and Hardbody Configurations	Safety and Hazard Classification of Solid and Liquid Energetics
VI	Liquid, Hybrid and Novel Propellants Combustion			Energetic Defect Characterization

COMBUSTION SUBCOMMITTEE (CS)

The JANNAF 52nd Combustion Subcommittee meeting will include sessions on chemical combustion phenomena occurring within the interior of guns and combustors of solid, liquid, and airbreathing (including small or expendable turbojets) missile and space propulsion systems. Papers are also invited that will aid in synthesizing, interpreting, and validating current knowledge to make research and development results more useful to design engineers. Specific areas of interest are listed below:

Mission Area I: Ignition and Combustion of Gun Propellants

Experimental and modeling studies of ignition, flame spreading, and combustion of solid propellants in guns, mortars and novel gas generators are considered. These studies include the investigation of ignition and ignitability, flame spreading, high-loading density charges, combustion temperature sensitivity, transient combustion (axial and radial pressure waves), and gun barrel erosion under high-pressure gun chamber conditions. Burn rate measurements and techniques, novel gun propelling charge concepts, interior ballistics of grain/stick/disk/consolidated and traveling charges are also considered. Innovative ignition systems and materials, novel chemical igniters and propellant formulations, experimental and analytical techniques to support the production of gun propellants and igniter materials, muzzle flash and blast, mechanical behavior and integrity of propellants in dynamic pressure wave environments, combustion behavior of thermally and mechanically damaged propellant, modeling and studies of surface-coated and deterred propellants, improved gun erosion and ballistic efficiencies through propellant chemical formulations and

additive manufacturing are among the many topics included in this mission area. Papers on gun propellant ignition and combustion and propellant vulnerability will be considered for joint CS/PSHS sessions. Technical sessions will be organized as will specialist session that are aimed at discussing new and urgent topics (see below for a list of current topics).

Specialist Sessions

CHEETAH Users Group: As a follow-up to the CHEETAH workshop held at the 48th JANNAF CS Meeting in December 2017, the mission area chairs are soliciting technical presentations (presentation required but paper optional) that highlight applications of the CHEETAH model, observations and/or shortcomings of the model as documented by researchers, and extensions made or suggested to be made to the model for particular applications as performed by individual researchers. The organization of a CHEETAH specialist session will be based on the number of presentations received.

Advances in Gun Tube Erosion Analysis and Testing: A majority of the armed services are proposing extended range munitions that can provide battlefield overreach for lethality (range) and terminal effects (velocity). One of the pivotal issues in weapons systems development and maintenance is the material erosion of the gun tube after repeated use – this erosion is caused by both mechanical and chemical processes and is highly dependent on propellant thermo-chemistry. M&S as well as laboratory-scale testing is often used to investigate erosion, but the problem is very complex. We are soliciting technical presentations (presentation required but paper submission is optional) that highlight R&D in gun tube erosion, modeling and simulation as well as lab-scale and simulator testing and propellant characterization. Presentations that address the problem in broad terms as well as those that investigate root causes are

equally encouraged. It is planned to solicit the participation of subject matter experts (SMEs) in gun tube erosion from all of the services. The organization of a Gun Tube Erosion Analysis and Testing specialist session will be based on the availability of the SME's and the number of presentations received.

Gun Propellant Burnrate Determination: As a follow-up to the JANNAF Closed Bomb Round Robin (1982) and subsequent JANNAF Closed Bomb workshops (1998, 2005, 2010) the mission area chairs are soliciting technical presentations (presentation required but paper optional) that highlight new technologies, techniques, and facilities for gun propellant burn rate measurement over a wide range of pressures. Previous JANNAF workshops (reports available from the JDOC database and/or the area chairs) have addressed many of the topics for Closed Bombs (CBs) that require to be updated given new challenges we face in layered, deterred, surface-coated, and additively manufactured gun propellants. In addition, the science of felted-fiber NC combustible cartridge cases has not been fully revealed while at the same time new materials for munition cases such as foamed celluloid are arising. Much of the community is starting to rely upon strand burners (SB) as a replacement for the CB, and so arises the question of SB applicability, confluence, and overlap considering CB facilities (i.e., pressure range). The relative ease at which SB samples are prepared and data (including visual) is taken considering pressure range restrictions and/or overlap with CBs is likely to be a popular topic. The organization of a Gun Propellant Burnrate Determination specialist session will be based on the number of presentations received.

Mission Area II: Solid Propellants and Combustion

Experiment and theoretical studies of solid propellants and their key ingredients are considered in this mission area. These studies can be related to the specific topics listed below.

- *Decomposition, Ignition, Kinetics, Combustion, and Extinguishment of Ingredients and Solid Rocket Propellants:* Decomposition of ingredients and propellants (including kinetics, mechanisms, microstructure, and thermochemistry of thermal decomposition); ignition of ingredients and propellants (including ignition mechanisms, ignition transients, igniter designs, especially smokeless igniters, and new problems associated with ignition); combustion of ingredients and propellants (including burn rate, pressure exponent and temperature sensitivity, understanding the microstructural combustion zone structure, chemistry, and heat release, effect of motor environment, including spin on combustion, transient burning, combustion of fuel rich propellants, analytical modeling including detailed kinetics studies); hazard initiation of propellants (including inadvertent ignition and effects of high burn rate); methods of extinguishing propellants and implementing thrust termination are considered. Of special interest is how these processes are related to new energetic ingredients and how this knowledge may be used to design new propellants that meet more demanding performance, insensitive munitions, and life cycle requirements. (Papers on thermal decomposition ignition and combustion will be considered for joint CS/ESHS sessions.)

- *Failure Analysis of Solid Rocket Motors:* Combustion analyses including ignition, flame propagation, burning in cracks and defects, burnback, and flow behavior in support of accident investigations and failure analyses of solid rocket motors are considered. (Papers in this area will be considered for joint CS/ESHS sessions.)
- *Solid Rocket Propellant Combustion Instability:* Experimental and analytical advancements are considered. Specific topics of interest include: combustion response of low smoke propellants; velocity coupled instability; nonlinear instability; instability at high pressures; motor pulsing; mean flow and acoustics interactions; L^* instability; high frequency instability in low smoke motors; combustion response function measurement techniques; and analytical methods for predicting propellant response functions and motor stability.
- *Metal Combustion:* Behavior of metallic ingredients with special emphasis on nano-particle metals in solid rocket motors is sought. Individual areas of interest include: ignition and burning rate of metal particles or droplets; metal combustion in high density propellants; effects of metal combustion on motor stability and performance; particle phase and size change phenomena; surface melt, agglomeration, and filigree formation; metal combustion in fuel-rich propellants and metal combustion in propellants without ammonium perchlorate; and methods for obtaining in situ particle size measurements.
- *Combustion, Prediction, Performance, and Other Topics in Solid Rocket Motor Behavior:* Combustion related motor behavior and the application of analytical models, experimental research, and subscale testing to their solution are considered. Areas of interest include: methodology for standardizing experimental measurements, measurement uncertainties, analytical prediction, computer code verification, correlation, extrapolation, and flight confirmation of performance of solid and liquid rocket, missile and space propulsion systems. Papers on grain design and ballistic modeling are also sought. Behavior in conventional ballistic, tactical, low smoke, controllable, spin-stabilized, ducted, nozzleless motors and gas generators are appropriate subjects for presentation, as are methods for calculating combustion chamber flowfields and their interaction with the motor structural components.

Specialist Session

Joint EPSS/CS Tutorial on Chemical Kinetics

Chemical Kinetics are fundamental to combustion processes that occur within rocket engines, solid rocket motors, air-breathing missiles, and the exhaust plumes they produce. The correct understanding of chemical kinetic mechanisms is essential to accurately predict and characterize combustion performance, energy release, thrust produced, and observable product species. However, discerning the chemical species, reaction mechanisms, and reaction rates that comprise the kinetic mechanism for a given set of propellant reactants is a complex activity that requires the complementary application of computational chemistry techniques and experimental measurements. This tutorial session is intended to present the

recent application of computational and experimental methods to determine new or updated chemical kinetic mechanisms of propellants of current interest to the signatures community. The presentations will be made in an open forum format to permit questions during each briefing so as to maximize information exchange and the edification of all attendees.

Mission Area III: Explosive Performance / Enhanced Blast

Investigations related to detonation and blast performance are sought. Topics ranging from detonation propagation, chemical species formed from the detonation, and combustion processes following the detonation are appropriate for this area. Experimental, theoretical, and computational studies are encouraged that address diverse subjects including; detonation properties, metal driving, enhanced blast, Chem/Bio defeat, target response, underwater blast, and blast protection.

Papers elucidating how new or existing energetic materials and/or novel munitions designs can be exploited are of interest. New experimental techniques, advanced diagnostics and new modeling capabilities that are applicable to the dynamic conditions inherent in detonation events are of interest to this community. Reports of propellant technologies that are applicable to explosive performance are also encouraged.

Of particular interest to this mission area are enhanced blast technologies. Investigations of combustion of detonation products, added fuels, and reactive material dispersal for enhancing blast effects in open-air and various confined structures are sought. Targets of interest include tunnels, caves, multi-room structures, and blast chambers. Papers reporting experimental, theoretical, and computational efforts specifically geared toward understanding the non-ideal, post-detonation energy release phenomena are requested. Papers concerning enhanced blast technologies that exploit novel explosive formulations, non-detonative energetic materials, and munitions designs are of interest.

Specialist Session

High Fidelity Modeling of Reactive Materials: The development of predictive modeling capabilities is required to assess performance and design reactive material (RM) formulations that have the desired chemical and physical properties. Models include continuum mechanics-based predictive code (with input from atomistic and mesoscale submodels) with parameters derived from experimental data obtained from measurements of constitutive behavior as a function of strain, strain rate. The mission area chairs are soliciting technical presentations (presentation required but paper optional) that highlight high fidelity modeling efforts focused on the linkage between mechanical properties and energy release phenomenology of RM. The organization of a Reactive Materials specialist session will be based on the number of presentations received.

Mission Area IV: Airbreathing Combustion

Airbreathing Combustion: Theoretical and experimental investigations of subsonic, supersonic, and hypersonic

combustion phenomena for airbreathing systems (including small or expendable turbojet engines) are considered. Specific topics of interest include: analytical and experimental (including CFD) determination of combustor flowfield characteristics; connected-pipe testing, freejet testing, and scaling analyses to free-flight conditions; experiments and analyses relating to ignition, mixing and combustion in liquid-fuel, gel/slurry-fuel, and solid-fuel ramjets, gas generator (ducted rocket) combustors, scramjets, and combined cycle engines; the use of ignition and combustion enhancement techniques; studies of liquid and gel/slurry fuel injection, spray formation, vaporization, and combustion processes; the measurement and analysis of combustion instability phenomena; investigation of the formulation, properties, and combustion of high energy-density single- and multi-phase fuels, including boron and other metal-burning slurries and gels; fundamental investigations of airbreathing combustion. (Papers in this area will be considered for joint CS/APS sessions.)

Mission Area V: Combustion Diagnostics

This area seeks to bring together the non-intrusive flow field diagnostics and computational fluid dynamics (CFD) communities to create an interaction beneficial to both. Papers are sought from the flow field diagnostics community on the development and implementation of new or existing instrumentation relevant to any combustion problem. Emphasis is placed on methods producing data required for code verification. Similar papers are sought from the computational community emphasizing measurement needs and uncertainties required for verification of existing CFD codes. This interaction is expected to result in development of new instrumentation for combustion research, methods designed specifically for high confidence measurements of critical CFD parameters, and new approaches for creating computational models.

Specialist Session

Enhancing Synergy between Flowfield Diagnostics and Computational Modeling: We envision hosting a specialist session which will focus on the benefits of, and desire for, enhancing synergy between flowfield diagnostics and computational modeling. The relationship between diagnostics and modeling is inherently symbiotic. However, we see a gap in communication between the two communities. Developers of diagnostics need to better understand what modelers require (and to what fidelity) to provide useful data. Modelers need to better understand what flowfield diagnostics can offer currently, and how they might be further developed to provide greater value.

We view participation from both the flowfield diagnostics and modeling communities as key, and therefore anticipate inviting speakers representing both communities and advertising the session to attract the targeted audiences. From a diagnostics perspective, practitioners of non-intrusive on-body and off-body diagnostics would be targeted, but not exclusively. Also, although part of the Combustion Subcommittee, we envision this session representing and attracting diagnosticians and modelers across the broader community including combustion/pulpsion, aerodynamics, and structural disciplines.

Mission Area VI: Liquid, Hybrid and Novel Propellants Combustion

This topic area solicits summaries of work planned, underway, or completed to support state of the art and emerging propellant formulation development for evolving, non-traditional mission applications as well as traditional applications. Primary applications of interest are in aerospace propulsion but would also include primary or auxiliary power system application developments reliant upon rapid gas generation.

- *Combustion Dynamics of Liquid and Gaseous Rocket Propellants:* Theoretical and experimental studies of steady and unsteady combustion phenomena in propulsion systems using liquid or gaseous propellants are considered. Areas of interest include: transient system or process analysis; characterization of the physical and chemical processes involved in combustion; performance, heat transfer, and cooling prediction methods for subcomponents, components, and assemblies including CFD approaches; stability prediction models; development and application of new instrumentation techniques applicable to spray characterization and measurement of species characteristics such as type, distribution, temperature, droplet velocity and evolution to vapor, etc.; subsystem effects on stability; feedback control, or other adaptive methods of stabilizing liquid engines; stability rating techniques; and validity of subscale stability studies.
- *Combustion Dynamics of Monopropellant, Bipropellant, and Hybrid Propulsion Systems:* Theoretical and experimental studies of steady, unsteady, transition from transient to steady state, and multi-phase combustion phenomena in propulsion systems using liquid monopropellants and bipropellants, liquid oxidizers and solid fuels are considered. Areas of interest include injection, mixing, analytical models of fuel regression rate, chemical kinetics of combustion, ignition system design, and simulation of combustor flows including in applications where these propellants are phase change to gaseous form useable by electric propulsion devices.
- *Combustion Dynamics of Hydrogen Peroxide (HP):* Theoretical and experimental studies of combustion phenomena in propulsion systems using HP are considered. Areas of interest include: effect of stabilizers and additives on longevity and reactivity of HP; development of advanced catalysts and catalytic devices for HP decomposition; chemical kinetics of catalysis; direct energy conversion including fuel cells, thermionics, and thermoelectrics; containment strategies mitigating decomposition over time using advanced materials; manufacture and chemical enrichment of HP; and historical usage of HP in propulsion applications.
- *Combustion for Underwater Propulsion:* Theoretical and experimental studies, numerical modeling, and simulation of steady and unsteady combustion phenomena in propulsion systems for underwater vehicles are considered. Topics of interest include but are not limited to: experimental determination and numerical simulation

of combustor flows; underexpanded reacting jets and their mixing, entrainment, and transport characteristics; transients in combustion processes (e.g., kinetics, ignition, quenching, acoustic oscillations in jets, reverse shocks, coherent turbulent structures in fuel-product baths); experimental studies of non- or slowly-reacting similarity systems; combustion similitude, model development, and verification; radiation and other heat transfer effects; behavior of multiphase and multiple, immiscible liquid-phase constituents in combustors; shock, turbulent mixing, and chemical kinetics interactions; and diagnostic measurements, simulation, and combustion instrumentation for underwater propulsion systems.

- *Areas of specific community interest:* Based upon the Combustion Town Hall Meeting held during the December 2017 JANNAF Conference, this Mission Area anticipates papers on the following topics: green monopropellant ignition and thruster scaling; MON25 thruster performance and stability; MON30/hybrid performance and stability; density-specific impulse increase of green monopropellants; results from the Air Force Research Laboratory Broad Agency Announcement for green monopropellant thrusters; green hypergolic performance & stability; and multi-mode applications.

Specialist Session

The Role of Metadata Approaches in the Advancement of Combustion Applications: Experimental chemical kinetics studies in combustion are of foundational importance, wherein discrete findings may be rationalized using modern ab initio quantum chemical, numerical molecular dynamics, or computational fluid dynamics simulations/theories, and/or other approaches to advance combustion models that cover a wide range of conditions. We are interested in metadata approaches that enrich the utilization of such 'basic' data, with information, which makes it easier to find, use and manage the entire scope of the relevant data domain, so that rapid advancement and fielding of combustion devices can happen.

In this Specialist Session, any area of the work that pertains to the above description will be considered for presentation.

JHU WSE ERG Technical Representative

For questions related to this subcommittee and its mission areas, please contact:

Mr. Peyton Nanney, JHU WSE ERG / Columbia, MD

Telephone: (443) 718-5007

Email: pnanne@erg.jhu.edu

AIRBREATHING PROPULSION SUBCOMMITTEE (APS)

The JANNAF 40th Airbreathing Propulsion Subcommittee sessions will discuss technical problems and issues associated with airbreathing propulsion systems for applications to missiles, launch vehicles, aerospace planes, and remotely piloted vehicles. These include technology, components, and engines within the turbojet, ramjet, scramjet, and combined cycle families. Session topics may include characterization of system performance, engine cycle analysis and testing, engine design, engine/airframe integration, thermal management, fluid and structural mechanics, advanced engine structures and materials, fuel control systems, and characterization of advanced airbreathing fuels.

Mission Area I: Turbopropulsion

Basic Technology and System Applications: Turbopropulsion technologies related to missiles, drones, and UAV systems for both subsonic and supersonic mission applications. Areas of interest include, but are not limited to, the following: innovative architectures, performance and operability, system integration, fuels, structures, materials and manufacturing, controls, thermal management, modeling and simulation, component level testing, ground/flight test experiments, and system-level assessments. Papers in this mission area will be considered for joint APS/CS sessions.

Mission Area II: Ramjet Propulsion

Ramjets: Welcome are papers describing either experimental or theoretical studies related to solid, liquid, and gaseous (ducted rocket) fueled ramjet systems or the constituents thereof. Authors are welcome to submit papers addressing ramjet and ducted rocket technologies at the component, section, or system level. By example, topics at the component level include techniques for mixing enhancement, active and passive control, plume signature reduction, instability, and testing techniques. Papers describing modeling and simulation studies of ramjets or their subcomponents are encouraged. Fuel development for subsonic, air-breathing applications continues to be an active area of research within the ramjet propulsion mission area.

Mode Transition: Papers that address mode transition either to or from that of conventional ramjet operation, e.g., boost to conventional ramjet or subsonic to supersonic combustion are welcome. Papers should emphasize the technology that assists in this transition.

Technologies with a Ramjet Application: Authors are encouraged to submit papers that address technologies applicable to ramjet systems, e.g., manufacturing technologies and fabrication techniques, etcetera. Papers need not be associated with a particular system but should be applicable to materials associated with such vehicles and their corresponding flight environment.

Mission Area III: Scramjet Propulsion

Fundamental and Applied Technology for integrated dual-mode and supersonic-combustion scramjets, components, and subsystems:

- Numerical methods for design, analysis, optimization, uncertainty quantification, and performance assessment, to include CFD, cycle analysis codes, and empirical methodologies.
- Experimental ground and flight tests of scramjet propulsion systems, test facilities and/or infrastructure, including test techniques and advanced measurement systems.
- Techniques and methodologies addressing propulsion system controls, thermal management and their impacts on scramjet operability and performance.
- Numerical and experimental results related to internal or external aerodynamics of scramjet powered vehicles.

Some papers in this area will be considered for joint APS/CS sessions.

Specialist Session

Hypersonic R&D Overview: Abstracts are requested for an overview session reviewing current activities in hypersonic R&D. Technical papers are not required but may be submitted in addition to the presentations.

Mission Area IV: Combined / Advanced Cycle Propulsion

Fundamental and Applied Technology: Combined and advanced cycle airbreathing propulsion and engine controls technology and systems. Of particular interest is numerical and experimental research regarding: 1) Aerodynamic, thermodynamic, and structural integration of multiple propulsive cycles and the manner of mode transition between cycles; 2) Methods of broadening the flight Mach number range of gas turbine and dual-mode ramjet cycles to facilitate mode transition; 3) Exploration of airbreathing cycles other than the Brayton cycle; and 4) System-level evaluations to include the choice of fuels, propulsion-airframe integration, and payoff assessments. Papers in this mission area will be considered for joint APS/CS sessions.

Mission Area V: Integrated Vehicle Design and Analysis

- *Integrated Vehicle Design:* Requesting papers on vehicle designs focused on integrated vehicle performance, trades, and mission applications. Topics of interest include, but are not limited to: vehicle designs, design methodologies, tools, systems integration, subsystem design, and trades/case studies. Additional topics of interest include system/vehicle level thermal management and subsystem design integration. Papers are specifically requested on high-speed airbreathing system design; however, papers on non-airbreathing high-speed vehicles are also welcome. Government only presentations are not desired; however, will be accommodated as needed to protect proprietary design concerns.

- **Multidisciplinary Analysis and Design Optimization:** Requesting papers on high-speed multidisciplinary analysis and design optimization. Specific topics of interest include, but are not limited to: non-deterministic design approaches, shape optimization, open design framework development, sensitivity/uncertainty analysis, metamodeling, and advances in analysis methods/approaches to reduce design-cycle time. Integrated vehicle and/or subcomponent design optimization and analysis approaches that focus on improving vehicle-level performance in a multidisciplinary framework are highly encouraged.
- **Structural Concepts and Airframe/Engine Integration:** Structural technologies for enhancing and enabling current and future airbreathing propulsion concepts and systems. Topics of interest include, but are not limited to: TPS and hot structures; structural solutions and technologies related to thermal management, including actively and passively cooled leading edge concepts; general design and analysis methods; considerations for structural joints and seals, specifically for multi-material interfaces. Papers are specifically requested which focus upon airframe/engine integration concepts and techniques from a system-level perspective.
- **Material Development, Fabrication and Manufacturability:** Papers are requested that emphasize manufacturing technologies and fabrication techniques. Papers need not be associated with a particular high-speed vehicle system but should be applicable to materials associated with vehicles operating in a high-speed flight environment. Papers on additive manufacturing applicable to scramjets are particularly encouraged. Papers addressing material characterization should make specific reference to intended use cases within a structural concept/component, challenges associated with the eventual integration into a structural system, and anticipated thermal and mechanical loading conditions under intended operating conditions. Papers on materials incorporated in recent or current high-speed flight vehicles are encouraged.
- **Multi-Physics Analysis and Experimentation:** Papers are requested which emphasize numerical frameworks and/or experimental investigations of compliant structures operating in extreme environments - with respect to both aerothermal and mechanical loading conditions. Papers addressing the challenges arising from integration of a structural component into a structural system are encouraged. Papers are sought which address the coupled interactions between structural deformations and a relevant loading environment. Specific focus should be on the impact of the multi-physics interactions on vehicle performance with respect to specific criteria, such as trajectory/mission requirements - Mach, range, thrust, etc. - or strength and serviceability requirements and useable service life.
- **High-Temperature/Extreme Environment Experimental Techniques:** Papers are sought which address innovative testing/experimental techniques for use in high-temperature/extreme environment testing regimes. Of specific interest are non-contacting, full-field data acquisition techniques which

can be developed and utilized for the generation of validation-quality data sets for this challenging class of problems. Techniques for use in laboratory settings, ground test facilities, as well as those which can potentially be included on flight test vehicles are encouraged.

JHU-WSE ERG Technical Representative

For questions related to this subcommittee and its mission areas, please contact:

Ms. Claire Shamul, JHU WSE ERG / Columbia, MD

Telephone: (443) 718-5011

Email: cshamul@erg.jhu.edu

EXHAUST PLUME AND SIGNATURES SUBCOMMITTEE (EPSS)

The 40th JANNAF Exhaust Plume and Signatures Subcommittee meeting will include sessions on phenomena associated with exhaust plumes from rockets, ramjets, space, and gun propulsion systems as well as wakes and hypersonic flows. These phenomena can be divided into three technical areas: plume/wake/hypersonic flowfields, plume/wake/hypersonic signatures (to include electro-optical [EO], infrared [IR], and radio frequency [RF] radiation), and a broad area incorporating other plume/wake/hypersonic effects.

In addition, the EPSS Signatures panel promotes technical interchange among members of the Electro-Optical/Infrared (EO/IR) aircraft/missile signature community from both government and industry.

Instructional Tutorial(s) are solicited. These instructional tutorials are intended to provide the opportunity for each community member to obtain an advanced technical understanding of plume/wake/hypersonic flowfield and signature phenomenology from experts in the field. Each tutorial should be related to a topic listed below. Tutorials should focus on a specific phenomenon or algorithm, provide clear technical instruction, be informative, and carry an academic tone. Tutorials should be limited to two hours or less. Please communicate your interest.

Mission Area I: Plume / Wake / Hypersonic Flowfield Analysis

Papers submitted should be concerned with basic definitions of nozzle and exhaust plume flow fields as well as wake and hypersonic flows. Solid propellant, liquid rocket, and ramjet exhaust plumes will be considered. In addition, plume/wake/hypersonic flow fields at all altitudes will be addressed. Some typical problem areas relating to low/mid-altitude exhaust plumes include external aerodynamic-plume interaction, combustion, turbulent mixing and afterburning, two-phase flow, multi-engine base flow, radiant heating, and oxidizer/fuel gradients. Typical high altitude vacuum plume problems include non-continuum flow, nozzle boundary layer

expansion, and condensation. Wake and hypersonic flow problems of interest include ablation mechanisms, flow field modifications caused by outer mold line shape changes due to ablation, and aerothermal heating.

Mission Area II: Plume / Wake / Hypersonic Radiation and Signatures

Papers are solicited which describe or highlight the following: recent achievements in plume/wake/hypersonic radiation and signatures (to include the EO/IR and RF regimes); plume/wake/hypersonic radiation and signatures related to the generation of vehicle design environments; detection, surveillance, and identification; advancement of theoretical prediction methods; experimental techniques; results of ground and flight measurements; interpretation and correlation of data; any portion of the electro-magnetic spectrum from ultraviolet through longwave infrared to radio frequency (RF) regimes; plume/wake/hypersonic radiation interactions with hardbodies in the RF portion of the spectrum; propulsion systems of all types in terms of thrust level, propellants used, application, and operating altitude; the effects of atmospheric species reacting with chemical constituents in plume/wake/hypersonic flows; plumes in a vacuum; and the effects of atmospheric species on EO/IR/RF signal/signature propagation between an object of interest and an observer.

Mission Area III: Plume / Wake / Hypersonic Effects

Papers are sought that address the experimental and theoretical characterization of exhaust plume and wake properties as well as their effects such as: impingement pressures and heating for low/high altitude spacecraft vehicle applications, the generation of plume contaminants, the effects of such contamination on vehicle surfaces, and the measurement of plume/wake chemical species concentrations in hypersonic flowfields. Also of interest are papers concerned with convective/radiative base heating due to multi-engine plume interactions.

Mission Area IV: Additional Plume / Wake / Hypersonic Topics

Other papers dealing with plume/wake/hypersonic flowfield and signature phenomenology and technology that are not covered by the aforementioned areas are invited.

Mission Area V: Composite Scene Signatures of Plume / Wake / Hypersonic Flowfield and Hardbody Configurations

Papers are solicited for the following topics related to composite scene signatures: EO/IR target signature phenomenology; EO/IR atmospheric transmission/radiation phenomenology and modeling; EO/IR signature target measurements; SPIRITS, FLITES and other signature composite scene codes; SPIRITS target modules; model development and improvements; validation and calibration; applications of signature and scene generation tools to acquisition programs, signature reduction, and operational applications.

JHU WSE ERG Technical Representative

For questions related to this subcommittee and its mission areas, please contact:

Mr. Nick Keim, JHU WSE ERG / Columbia, MD

Telephone: (443) 718-5005

Email: nkeim@erg.jhu.edu

ENERGETIC SYSTEMS HAZARDS SUBCOMMITTEE (ESHS)

The JANNAF 34th Energetic Systems Hazards Subcommittee meeting will address hazards and related technology areas for energetic materials (including propellants, explosives, and pyrotechnics) found in warheads and propulsion systems of munitions. Topics of interest include the identification of potential hazards to energetic systems, the application of meaningful computational / experimental methods for assessing hazard risk, the determination of important hazard technology areas, and the development and standardization of computational / experimental methods for minimizing/mitigating the risk of hazards in relevant systems. Papers are invited that (a) address any aspect of vulnerability and survivability, loading and firing hazards of propulsion



systems, and weapon systems safety; or (b) aid in synthesizing, interpreting, and validating current knowledge to make research and development results more useful to the design engineer. Meeting topics generally fall into one of two groups: (1) hazards evaluation or (2) hazards mitigation technology.

Mission Area I: Thermal Decomposition and Cookoff

Mission Area I addresses hazards associated with thermal decomposition and cookoff of energetic materials, ammunition, munitions, and rocket motors.

- *Thermal Decomposition, Ignition, and Combustion:* Fundamental experimental and modeling studies of thermal decomposition of reactive materials including EM ingredients and formulations; changes in reactivity from autocatalytic, self-heating and confinement effects; thermal ignition of EMs; and combustion of EMs in off-design scenarios. (Papers in this area may be considered for joint ESHS/CS sessions.)
- *Thermally-Induced Damage Effects:* Research related to thermally-induced damage with the potential to produce changes in burning rate and material sensitivity with implications for both safety and performance. Studies of the creation, measurement, and assessment of thermal damage in EMs and the associated safety and/or performance effects are encouraged. (Papers in this area may be considered for joint ESHS/CS sessions.)
- *Cookoff Hazards Assessment and Mitigation:* Cookoff response of energetics systems and components; cookoff mitigation technologies; threat/hazards assessment (THA) of cookoff scenarios; relationships between THA and cookoff test procedures; small scale test methodologies for predicting cookoff of full scale systems; effects of heating rate on cookoff response.
- *Thermal and Combined Environments:* Hazards from thermal environments produced in operational and accident scenarios. This may include experimental and modeling studies of the environments themselves (e.g. aerothermal heating, fire, etc.) and the response of energetic systems (propellants, explosives) to those environments. Effects of combined mechanical/thermal environments produced by accident scenarios (e.g. crash-and-burn) and advanced delivery systems (e.g. g-force, vibration + aerothermal) are also of interest.

Mission Area II: Shock / Impact-Induced Reactions

Mission Area II is focused on chemical reactions in energetic materials resulting from either strong or weak impacts. These chemical reactions may result in a detonative response (e.g., a shock-to-detonation transition [SDT]) or a sub-detonative event (e.g., deflagration).

- *Energetic Materials Testing:* The development and use of shock sensitivity tests such as gap testing, as well as material characterization experiments (e.g., gas gun experiments and wedge tests).

- *Modeling and Simulation:* In addition to energetic material testing, topics related to model development and simulations used for predicting the energetic material's response to stimulus and impact.
- *System Performance and Lethality:* Finally, system performance and lethality data necessary for model validation and improved characterization of energetic impact events are of interest.

Mission Area III: Insensitive Munitions Technology

Mission Area III supports advances in technologies to reduce or eliminate violent response by a munition when exposed to unintentional stimuli, such as fast or slow heating, bullet or fragment impact, or shaped charge jet impact.

- *IM Technology:* Historical reviews of prior IM technology developments and lessons learned from integration into munitions, ongoing development efforts both general and specific to systems/munitions, design and functional details of passive and active mitigation concept, results of IM and Safety testing of components and complete systems, and evaluation of the relationship between small-scale and full-scale testing.
- *Emerging Issues:* New IM concepts, design trade-off studies, novel computational methods, leveraging different computational methodologies for RDT&E, new and emerging threats, new and/or revised experimental test and evaluation methodologies/analyses, updates to the NATO IM Portfolio, and harmonization of tests/analyses such as the new Insensitive Munitions - Hazard Classification (IM-HC) AOP-4864.

Mission Area IV: Combustion Vulnerability of Stowed Energetics

Mission Area IV focuses on the response of onboard energetic materials—including fuels, batteries, refrigerants, and stowed munitions—to an ignition source (e.g., shaped charge jet).

- *Stowed Energetic Response:* Detonation, deflagration, or detonation to deflagration (DDT) reactions or burning of any vehicle based energetic system (i.e., fuels used for propulsion, hydraulic oils, lubricants, stowed propellants and ammunition, Li-ion batteries, refrigerants, etc.) when subjected to an ignition source.
- *Experiment Methodologies:* Data collection, analysis and results and modeling and simulation, included but not limited to vulnerabilities to vehicle platforms and mitigation solutions, sympathetic detonation, response of vehicle energetics to overmatching ballistic threats, and characterization of non-conventional energetic materials.

Mission Area V: Safety and Hazard Classification of Solid and Liquid Energetics

Mission Area V addresses explosives safety siting and hazard classification for DoD ammunition and explosives, small arms, CAD/PAD, rocket motors, warheads, bombs, energetic liquids, and any system that contains energetic materials:

- *Propulsion Systems Safety and Hazard Classification:* Harmonization of hazard classification and insensitive munitions testing, issues identified by the service safety offices, hazard classification issues, differences between insensitive munitions and hazard classification and safety testing and standardization, assessment of response and pass/fail criteria, alternate test protocols and the role of small scale to full scale testing and hazard classification, and miscellaneous safety issues and programs.
- *Hazard Classification of Large Solid Rocket Motors:* Test methods/procedures, analysis techniques, experimental data and computer simulation results related to the assessment of hazard response of large solid rocket motors for hazard classification purposes. In particular, papers covering three hazard scenarios are of interest, including: (1) detonation/explosive reaction characteristics of various propellant families subjected to explosive shocks, for example critical diameter, shock sensitivity, and the relationship between the two parameters; (2) response of large SRMs in an engulfing fire or fast cookoff scenario; and (3) criteria and effects of propellant damage on hazard response of large SRMs in impact and other accident scenarios.
- *Energetic Liquids, Hypergolics and Gels:* The Department of Defense Explosives Safety Board establishes criteria for the hazard classification and siting of energetic liquids, hypergolics and gels DESR 6055.09. These criteria were last updated in the late 1990's. Current space initiatives require new energetic materials and new combinations of existing materials. These materials in new configurations require improved/new tests and methods for hazard classification. They also, require approaches for siting a variety of configurations, concentrations, purity, etc. Alternative test methods, the role of small scale to full scale testing for hazard classification, modelling and miscellaneous safety issues need to be determined and evaluated.

Mission Area VI: Energetic Defect Characterization

Mission Area VI supports ongoing work in the energetics community performed by the DoD, DOE, and others to evaluate and predict the effects of defected energetic materials in extreme environments such as launch, hypersonic flight, and target impact.

Does Your Abstract Need to be Approved before Submitting?

Many organizations require abstracts to be processed through an approval system prior to submission. This process takes additional time (in some cases, as much as 6 weeks), so authors should plan accordingly in an effort to meet the 9 June abstract deadline date.

- *Defect Parameterization and Criticality Deduction:* Defect detection and determination; munition and energetics inspection; X-Ray and XCT SOPs and specifications; characterization of defects by type, parameter, and location.
- *Testing and Evaluation:* New/novel experimental methodologies, SOPs, and equipment; new/novel computational methodologies, codes, and software; applicable sub-scale evaluation techniques for defect characterization; time scales and granularity of defect parameter analyses.

JHU WSE ERG Technical Representative

For questions related to this subcommittee and its mission areas, please contact:

Mr. William A. Bagley, JHU WSE ERG / Columbia, MD

Telephone: (410) 718-5009

Email: wbagley@erg.jhu.edu

WORKSHOPS/SPECIALIST SESSIONS

Recommendations for workshops or specialist sessions are solicited at this time. **Individuals interested in organizing and chairing a workshop or specialist session should contact the JHU WSE ERG Technical Staff member in their respective subcommittee by the Deadline of 9 June 2023.**

Workshops

The JANNAF Workshop is reserved for bringing the community together to address a specific task or problem, the outcome of which is important and substantial enough to warrant the publication of a final report detailing the discussions, conclusions, and recommendations that resulted from the workshop.

Requirements for JANNAF workshops and established best practices can be found in the [JANNAF Workshop Guide for Chairs](#); this document will guide you through the planning and approval process for workshops held at a JANNAF meeting.

To request a workshop you must submit a [Workshop Request Form](#) to your JHU WSE ERG Technical Representative (see pages 6 - 15 for contact information) or the JANNAF Meeting Planning Team at meetings@erg.jhu.edu. This form must be submitted to ERG by **Friday, 9 June 2023**. The agenda and invitation list is due **Friday, 25 August 2023** for inclusion in the Preliminary Program, and must be approved no later than **Friday, 6 October 2023** for inclusion in the Final Program.

Specialist Sessions

A JANNAF specialist session is an opportunity for experts in a specific technical area to meet to stimulate ideas and contributions from the audience. These sessions are dedicated to a single topic and often include invited presentations. The organization of these sessions is similar to a regular JANNAF paper session with time allocated to individual presentations; however, specialist sessions often include moderator led discussion periods or a question and answer session with expert panelists. Unlike a regular JANNAF paper session, the presentations from specialist sessions may

or may not be published as part of the meeting proceedings. Publication can include an executive summary authored by the session chair if desired.

To request a Specialist Session for this JANNAF meeting, a **Specialist Session Request Form** must be submitted to JHU WSE ERG. This form requires a statement of justification for the Specialist Session along with a well thought out agenda. Requests will be reviewed by the designated JANNAF subcommittee TSG chair and ERG for approval; this approval is necessary for any Specialist Sessions to be included in the Final Program.

The deadline for submission of a Specialist Session request is 9 June 2023, and forms *must* include a detailed draft agenda. In order for the draft agenda to be included in the Preliminary Program, all Invited Presentation details must be submitted online via the **Abstract Submittal Site** no later than **Friday, 25 August 2023**. To be included in the Final Program, the final agenda and online submission of all Invited Presentation details must be received no later than **Friday, 6 October 2023**. If you have any questions about planning a Specialist Session please contact your ERG Technical Liaison or the JANNAF Meeting Planning Team at meetings@erg.jhu.edu.

JANNAF AWARDS PROGRAM

In the tradition of recognizing the outstanding achievements by members of the propulsion community, the JANNAF Technical Executive Committee (TEC) and Programmatic and Industrial Base Committee (PEC), as well as the Combustion (CS), Airbreathing Propulsion (APS), Exhaust Plume and Signatures (EPSS), and Energetic Systems Hazards (ESHS) subcommittees, are soliciting nominations for awards to be presented at the meeting. A TEC or PEC Award is justified if the achievement or service is in a technical or programmatic area that is not covered by an existing subcommittee, or is of such scope or magnitude that merits this recognition.

Special Recognition Awards

The **Special Recognition** awards for **Sustained Contribution** and **Lifetime Achievement** honor individual achievements, either in the last 18 months or for a lifetime of dedicated service. These awards are the most prestigious subcommittee awards and reflect on the awardees' contributions to JANNAF.

Special recognition award winners will be selected by respective subcommittee Awards Committees based on review of the nomination in consideration of the following:

- Technical value of the achievement(s) including level of technical complexity and challenge, quality of results, degree of innovation and timeliness of research.
- Impact of the achievement on the broader propulsion community.
- For individuals nominated for lifetime achievement, demonstrated participation in technical societies as evidenced by positions held and papers published will be considered favorably.

Outstanding Achievement Award

The **Outstanding Achievement Award** is given for the most outstanding technical achievement in the subcommittee's area by an individual, by a team within an organization, or by a team of organizations. To recognize the varied nature of the JANNAF subcommittees and the accomplishments of their communities, nominations may be solicited and given in the two focus areas of R&D Technology and Operational Systems.

- The achievement shall have been accomplished in the previous 18 months.
- The nominees must have worked for the organization during the same 18-month period of performance.

Certificate of Commendation

The **Certificate of Commendation** is given to recognize an individual whose contributions within the last 18 months have been pivotal in ensuring the success of a JANNAF activity.

Certificate of Appreciation

The **Certificate of Appreciation** is given to recognize individuals for outstanding contributions and dedicated service to JANNAF.

Nominations

To nominate an individual for one of the above awards please use the **JANNAF TEC/PEC and Subcommittee Award Nomination Form**. Nomination submissions should include the following:

- A description of the achievement or distinguished service, of no less than 200 and no more than 1000 words. The description must be typed or provided in electronic format (Adobe Acrobat PDF or MS Word) via email.
- Supporting data (if desired) of no more than 10 pages.
- Supporting curriculum vitae, list of publications, and/or professional activities as required to support the nomination.
- Contact information for the nominee(s) and the nominator, including organization affiliation, phone number, and email address.

Nominations should be submitted to the appropriate JHU WSE ERG technical representative no later than **Friday, 29 September 2023**.

Best Paper Awards

In addition to the nomination awards listed above, JANNAF recognizes authors of papers that exhibit excellence and significant merit with the **Best Paper Awards**. Best Paper Awards from this meeting will be acknowledged in *JANNAF News* and announced at the next JANNAF Subcommittee meeting.

Best Student Paper Awards

The **Best Student Paper Award** will be given to a *current* undergraduate or graduate student who authors a paper that exhibits excellence and significant merit. One paper will be selected to receive the Best Student Paper Award. Please be sure to indicate within the abstract submission if you wish to be considered for the Best Student Paper Award. Please note that a student must be the paper's primary author to be considered for this award.

As a reminder: student authors must conform to the same JANNAF attendance eligibility requirements as other authors, per the policy on non-government attendees at JANNAF meetings given on page 2. Student authors are encouraged to work with their advisors to ensure they meet these requirements, and should contact the JANNAF Security Team (Mary Gannaway at mgannaway@erg.jhu.edu or Mionna Sharp at msharp@erg.jhu.edu) at their earliest convenience with questions regarding their eligibility and participation.

Student papers will be reviewed upon submission of their cleared manuscripts. In order to be considered for the student best paper selection, the completed paper must be provided to JHU WSE ERG by **Friday, 29 September 2023**. A signed and completed [JANNAF Publication Clearance Form](#) must be submitted for the paper as well. This form will be provided in the Author section of the meeting website once abstract decisions are disseminated. The Best Student Paper Award will be presented at the JANNAF meeting at which the paper is given.

UPCOMING JANNAF MEETINGS

70th JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
48th Structures and Mechanical Behavior
44th Propellant and Explosives Development and Characterization

33rd Safety and Environmental Protection
17th Modeling and Simulation
1st High Temperature Material Applications
Joint Subcommittee Meeting

May 22-26, 2023

Pittsburgh, PA

52nd Combustion
40th Airbreathing Propulsion
40th Exhaust Plume and Signatures
34th Energetic Systems Hazards
Joint Subcommittee Meeting
Programmatic and Industrial Base Meeting

December 4-8, 2023

Salt Lake City, UT

71st JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
18th Modeling and Simulation
14th Liquid Propulsion
13th Spacecraft Propulsion
Joint Subcommittee Meeting

Spring 2024

Specific Dates and Location TBA

ABSTRACT DEADLINE

Friday, 9 June 2023