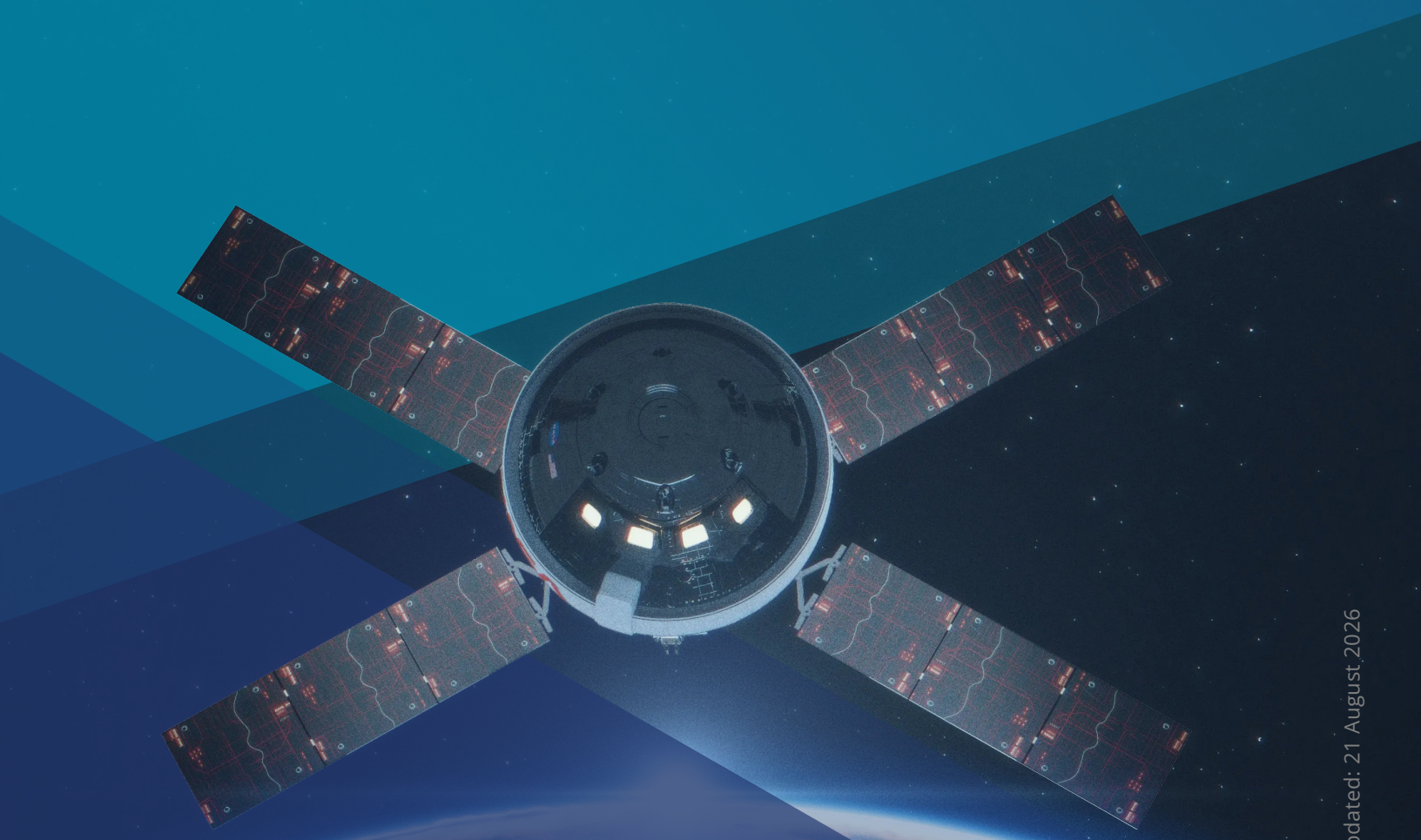
JANNAF
INTERAGENCY PROPULSION COMMITTEE

74th JPM | PIB Meeting | 21st MSS | 16th LPS | 15th SPS
Joint Subcommittee Meeting

Call for Papers

17 – 21 May 2027 **Huntsville, AL**



Abstract Deadline:
13 November 2026

Last updated: 21 August 2026

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Front cover image credit: NASA

What? May 2027 JANNAF Interagency Propulsion Committee meeting

When? Monday through Friday, 17–21 May 2027

Where? Huntsville Marriott at the Space and Rocket Center in Huntsville, Alabama

Meeting Chair:
Dr. Robert B. Lobbia, Jet Propulsion Laboratory, Pasadena, CA

The following subcommittees will meet:
JANNAF Propulsion Meeting (JPM)
Programmatic and Industrial Base (PIB)
Modeling and Simulation (MSS)
Liquid Propulsion (LPS)
Spacecraft Propulsion (SPS)

For additional information, visit the May meeting page.

WHY SHOULD YOU ATTEND A JANNAF MEETING?

[According to previous JANNAF Meeting attendees]

ATTENDANCE REQUIREMENTS

The overall security level of the meeting is **Unclassified**. All sessions will be held at the Huntsville Marriott at the Space and Rocket Center. Attendance is restricted to US citizens employed by a DoD, DoE, or NASA facility, or with a DoD, DoE, or NASA contractor facility eligible for receipt of militarily-critical technical data. No foreign nationals are permitted to attend.

All attendees will need to have an active JANNAF account. Instructions can be found here.

Non-government attendees (including contractors, consultants, and universities) will need the following:

1. Current government contract or certification from a Sponsoring Government Official
2. Employer's DD 2345 certification number for receipt of militarily-critical technical data

   DD 2345: 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/.

Questions concerning attendance eligibility and JANNAF account access should be directed to Mionna Sharp (msharp@erg.jhu.edu) or by calling (410) 992-7300 ext. 224.

REGISTRATION

Preliminary registration information is provided on the May meeting website with full details available when registration opens in early March. All attendees, including presenters, must register and pay the registration fee.

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. 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.

JANNAF IS SOLICITING ABSTRACTS FOR BOTH PAPERS AND POSTERS.

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 7–27.
- **The deadline date for submission of the online abstract form is 13 November 2026**. If you need to submit an abstract after this date, please contact ERG (meetings@erg.jhu.edu).
- **Your organization may require abstracts to be processed through an approval system prior to submission. This process takes additional time, so authors should plan accordingly to meet the abstract deadline date.**
- Submitting an abstract represents an agreement to **submit a final paper for publication by 16 April 2027**, attend the meeting, and deliver a 25-minute presentation or a poster. The JANNAF Policy of "No Paper, No Podium" will be in effect for this meeting, with the exception of posters.
- **All abstracts are to be submitted via the JANNAF Abstract Submittal Site**. A JANNAF account is NOT required to submit an abstract.
- Submit only unclassified abstracts with content that is distribution statement A (approved for public release) or C (distribution authorized to US Government and its contractors). **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.
  - » Dissemination of information from JANNAF presentations is primarily relegated to either Statement A (approved for public release) or Statement C (Distribution authorized to US Government and their contractors).
  - » To properly secure them, presentations marked with Statement B (US Government agencies only), Statement D (US Department of Defense and US 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 on the Abstract Submittal Site is limited to 150 characters including spaces.
- Only a primary author should be listed when submitting your abstract, unless the presenting author is someone other than the primary author. If accepted, there is no author limit 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 abstract submittal 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 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 ***with or without*** an active JANNAF Account. Contact meetings@erg.jhu.edu if you require assistance.
   - » If you are submitting an abstract without an active JANNAF Account, and have not received a validation code (from info@erg.jhu.edu) within 30 minutes of submitting the request, after confirming that the message is not in your junk/spam folder, email meetings@erg.jhu.edu.
   - » If you are submitting an abstract without an active JANNAF Account, you may use your validation code to submit more than one abstract.
2. After reaching the Abstract Landing page, select the May 2027 meeting, and then click the dark blue "Create new abstract" 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.
3. When all required fields have been completed accurately, submit your abstract. You will have the opportunity to review your responses before you submit.

AUTHOR TIMELINE

Dates below are subject to change.

Date	Weeks to Meeting	Action
13 Nov 2026	26	Deadline for receipt of abstracts via Abstract Submittal Site.
13 Nov 2026	26	Deadline for submission of Workshop and Specialist Session request forms
25 Jan 2027	16	Approximate date for committee decision emails sent to authors.
5 Feb 2027	14	Deadline for changes to Meeting Invitation and Preliminary Program.
1 Mar 2027	11	Approximate date for Meeting Invitation, Preliminary Program, and registration materials announced to propulsion community.
12 Mar 2027	9	Deadline for award nominations and submittal of Student papers for Best Student Paper award consideration
2 April 2027	6	Deadline for submission of changes to the Final Program
16 April 2027	4	Last day for discounted Early registration fee.
16 April 2027	4	Deadline for receipt of papers and publication clearance forms. Papers not received by this date may be removed from the program.
26 April 2027	3	Deadline for reservations at Huntsville Marriott at the Space and Rocket Center.
30 April 2027	2	Last day to register at Regular registration fee (registration form submission and registration fee payment). Late registration required thereafter.
30 April 2027	2	Deadline for receipt of presentations
17 May 2027	0	Start date for JPM/MSS/LPS/SPS/PIB Joint Subcommittee Meeting

MEETING SUBCOMMITTEES & MISSION AREAS

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

Mission Area	JPM	MSS	LPS	SPS
I	Tactical Propulsion	Model-Based Engineering	Liquid Engine Systems	Chemical Propulsion
II	Missile Defense / Strategic Propulsion	Integrated Health Management	Liquid Combustion Subsystems and Components	Electric Propulsion
III	Propulsion Systems for Space Access	Simulation Credibility: Verification, Validation, and Risk	Liquid Propellant Feed and Pressurization Systems	Micro / Nano Spacecraft and MicroNewton Propulsion
IV	Gun and Gun-Launched Propulsion	Model Based Test and Evaluation (MBTE)	Advanced Materials for Liquid Propulsion Applications	Future Technologies
V	Propulsion and Energetics Test Facilities	Energetics Modeling and Simulation	Rotating Detonation Rocket Engines	
VI	Sensors for Propulsion Measurement Applications		Propulsion-Induced Environments and Structural and Thermal Loads	
VII	System-wide Application of Additive Manufacturing for Propulsion Applications			

JPM

JANNAF PROPULSION MEETING

JHU WSE ERG Technical Representative
Mr. Michael "Miki" Fedun / JHU WSE ERG / Columbia, MD
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The JANNAF Propulsion Meeting (JPM) encompasses research and applications at the systems level. The JPM is held each year in conjunction with standing JANNAF subcommittee meetings on a rotating basis. The scope of the 74th JPM spans seven mission areas (MA): Tactical Propulsion; Missile Defense/Strategic Propulsion; Propulsion Systems for Space Access; Gun and Gun-Launched Propulsion; Propulsion and Energetics Test Facilities; Sensors for Propulsion Measurement Applications; and System-wide Application of Additive Manufacturing for Propulsion Applications.

The 74th JPM sessions will cover systems development within the seven mission areas described below. Questions concerning these areas or the topics being solicited should be directed to the JHU WSE ERG Technical Representative for JPM.

Mission Area I:
Tactical Propulsion

This area encompasses all tactical propulsion systems including those applicable to air-to-air; air-to-surface, surface launched and underwater missions. Typical systems include tactical missile boosters or sustainers, kinetic energy missiles, free-flight rockets, anti-radiation, anti-ship, anti-armor, anti-personnel/materiel missiles, ramjets, scramjets, and combined cycle propulsion. System studies that evaluate advanced propulsion concepts and demonstrations that incorporate one or more component technologies applicable to tactical propulsion are of interest. Examples of component technologies include propellants and fuels, fuel management systems, cases and combustors, inlets, nozzles, thrust vector control systems, thrust management systems, and advanced materials applications. Life cycle cost and demilitarization are also topics of interest.

Manufacturing technologies and fabrication techniques: Papers need not be associated with a particular system but should be applicable to materials associated with such vehicles and their corresponding flight environment. Abstracts are especially sought on the following topics:

- Airbreathing propulsion systems
- Hybrid propulsion systems
- Solid propellant rocket propulsion systems
- Demilitarization
- Hypersonic propulsion systems
- Improved missile kinematics
- Insensitive munitions (from a systems perspective)
- Propulsion system product improvement
- Manufacturing technologies and fabrication techniques

Airframe Structures and Materials: Materials development and characterization, and structural concepts, design, test, and validation for Airframe applications and components exposed to extreme environments as found in atmospheric high speed or reentry conditions. Topics of interest include: TPS and hot structures; materials; structures and related technology for leading edges; exterior acreage surfaces; control surfaces; hot structures; and seals (penetrations). Further topics include hot and integrated structures; acreage thermal protection systems, including ceramic matrix composites, tiles, blankets, ablators, and metallics; fuel tanks, including cryogenic and hydrocarbon, composite and metallic; leading edges, including active, passive, and heat-pipe-cooled; design and analysis methods; and seals. System-level design and analysis methods for power and thermal balancing the various heat loads with available heat sinks—especially time-unsteady—are of interest. Papers on structures and materials that have recently flown, or are planned for flight, on flight vehicles are encouraged.

Mission Area II:
Missile Defense / Strategic Propulsion

This area includes technology applicable to ballistic missiles, trans-atmospheric vehicles, and missile defense. Emphasis should be on system-level papers discussing propulsion technology for new vehicle systems, upgrades, modernization and sustainment; failure investigations; and economic considerations that include evolving business practices, life cycle cost estimation, and approaches that reduce development and operations costs and schedules. Papers are requested that emphasize sustainable manufacturing technologies and fabrication

techniques. Papers need not be associated with a particular system but should be applicable to materials associated with such vehicles and their corresponding flight environment. Abstracts are especially sought in the areas of:

- Ground-based and sea-based strategic systems
- Ground-based, aircraft-based and sea-based missile defense
- Anti-satellite systems
- Advanced (including low or non-toxic) propellants
- Advanced (including light weight and/or high temperature) materials
- Insensitive munitions technologies
- Energy management approaches
- Dual mode systems (airbreathing/rocket)
- Unconventional propulsion
- Divert propulsion/attitude control propulsion
- Post boost control system propulsion
- Innovative propellant tank and valve technologies (including hot gas valves/pintles)
- Aging and Surveillance of propulsion systems
- Methodologies for determining space propulsion system useful life from design analysis and ground-based testing
- Manufacturing technologies and fabrication techniques including the use of 3D printing for strategic and missile defense propulsion system components
- US-sourced sustainable materials
- Demilitarization or alternative applications of heritage propulsion system

Mission Area III:
Propulsion Systems for Space Access

This area focuses on existing or potential primary and auxiliary government, commercial or foreign propulsion systems for earth-to-orbit vehicles or in-space propulsion systems. Emphasis should be on system-level papers discussing propulsion technologies for new vehicle systems, upgrades and modernization, failure investigations, and evolving business practices that reduce development and operations costs while increasing mission reliability. Papers should address future access to space missions, future exploration missions and needs, vehicle system architectures, and the identification of critical propulsion requirements technologies that must be enabled to support these new system requirements.

Manufacturing technologies and fabrication techniques: Papers need not be associated with a particular system but should be applicable to materials associated with such vehicles and their corresponding flight environment. Abstracts are especially sought in the following areas:

- Methods for development of design reference missions and vehicle systems architecture
- Future or current vehicle systems that use either solid or liquid propulsion
- Description of vehicle systems analysis models and assumptions including risk
- Description of vehicle system full scale testing versus model analysis and assumptions including risk
- Details of architecture studies and descriptions of promising vehicle architectures
- Uncertainty evaluation of vehicle systems analysis

- Cybersecurity and its relationship to operation and protection or risk of vehicle or propulsion systems
- Results of sensitivity analysis of key parameters on vehicle dry mass fraction margin, gross take-off weight, cost, reliability, and safety, with emphasis on propulsion
- Methods for identification and prioritization of critical enabling propulsion technologies
- Approaches for utilizing higher fidelity propulsion analyses in the overall systems architecture model(s)
- Methods to standardize model assumptions and fidelity in order to make relevant comparisons between vehicle architectures and various propulsion system options
- Description of promising new propulsion systems including risk assumptions
- Description and status of the access to space propulsion system technology or development activities
- Small launch vehicle mission analysis
- System analysis for responsive space access
- In-Space Propulsion systems
- In-Space individual spacecraft systems (suits or vehicles)
- Manufacturing technologies and fabrication techniques
- Manufacturing use of 3D printing for propulsion hardware
- Testing use of 3D printing for propulsion hardware

Mission Area IV:
Gun and Gun-Launched Propulsion

This area embraces technologies applicable to small-, intermediate-, or large-caliber guns, as well as gun-launched rocket propulsion, for air, sea, or ground/mobile weapons systems. Typical rocket assisted systems include kinetic energy missiles and extended range projectiles, both guided and unguided. Abstracts are especially sought in the following areas:

- Conventional gun propulsion concepts to include solid and liquid propellants
- Unconventional gun propulsion concepts
- System-level gun propulsion studies (gun tube wear and erosion, blast/flash mitigation, improved system survivability)
- Concepts to enable propulsion systems (i.e., gun barrel and/or rocket motor case) to achieve higher operating pressures
- Assisted projectiles
- Assisted guided munitions
- Propulsion design and accommodation for novel launch packages to include UXV
- Insensitive munitions
- Gun propulsion concepts using additive/advanced manufacturing methods
- Gun propulsion concepts to increase loading density and/or deliver highly optimized gas generation rates (GGR)
- Novel ignition system and propelling charge architectures

Mission Area V:
Propulsion and Energetics Test Facilities

This area targets issues, technologies, and achievements relevant to the operation and use of rocket propulsion test facilities for demonstration, development, characterization, and qualification of rocket, spacecraft, and gun propulsion systems, energetics, fuels, and materials for propulsion applications. Eligible test facilities include static test facilities for liquid rocket engines, solid rocket motors, electric and in-space propulsion systems, hypersonic

test facilities, gel motors, air breathing propulsion systems, hybrid propulsion systems, explosives, insensitive munitions, wind tunnels, altitude/vacuum chambers, and other rocket propulsion technologies; laboratory test facilities for fuels, energetics and materials science characterization; and test ranges for missiles, guns, and rocket sleds. Abstracts are specifically solicited on the following topics:

- Best practices and testing standards, current state-of-the-art
- Integrating instrumentation, advanced diagnostics, controls, and data acquisition systems
- Static and dynamic thrust measurement systems
- Propellant and materials handling and safety
- Accident and incident lessons learned
- Test facility modeling
- Challenges in maintaining test facilities
- Current testing limitations and gaps that need to be filled

Abstracts on improvements in base infrastructure, updates and upgrades of test stand capabilities, new propellant inventories, or other general advertisements of capabilities or assets will not be considered for this area.

Mission Area VI:
Sensors for Propulsion Measurement Applications

This area captures technologies and advancements in sensors and measurement devices for rocket and gun propulsion applications. Emphasis should be on development, application, modeling and integration of sensors for use in various propulsion applications. Abstracts are specifically sought on systems and sensors for:

- Storage, tanking and cryogenic systems, including true cryogenic mass flow; cryogenic temperature measurement; mass and level measurement in micro and zero gravity; pump and turbomachinery induced pressure fluctuations; leak and tank integrity monitoring; and other propellant feed and storage measurements
- High-temperature systems and hostile environments, including: extreme high-temperature measurements, real-time nozzle erosions and fuel regression; material ablation, flame propagation, high temperature electronics, packaging, and communications; and measurement and analysis of thermal effects on pressure transducers
- In-chamber diagnostics, including development of methods to make measurements of velocity, temperature, pressure, and/or other flow quantities inside of firing combustion chambers
- Plume measurement technology, including methods to utilize plume measurements to understand chamber operating conditions and spacecraft contamination issues
- Systems health monitoring and non-destructive evaluation (NDE) and repair, including: test stand characterization and control; structure and sense line frequency characterization; micro and nanotechnologies; systems for conversion of sensor data into actionable knowledge; technologies for intelligent health management systems; integrated fiber optics, electromagnetic NDE technologies, NDE data processing and analysis; life cycle monitoring of solid rocket motors; and monitoring of aeroshells and ballutes during reentry
- Smart sensing technology, including the development of sensors capable of automatic calibration and fault detection; intelligent sensors that are calibrated in situ and provide dynamic compensation for environmental changes (temperature, humidity, etc.); fault detection also including any fault that would cause a sensor to provide inaccurate information such as sensor damage, lead wire damage or disconnection, and the disbonding or detorquing of the sensor; smart and distributed sensor system approaches, systems architectures, and applications
- Chemical sensors suitable for solid rocket motor environments and applications (sensors of interest include those for measuring the chemical state or composition of a solid, including gaseous diffusion, liquid diffusion,

changes in free volume, direct measurement of changes in molecular weight or molecular weight per crosslink due to chain scission or the reaction products which result from chain scission); and development and applications of sensors that do not alter the chemical equilibrium of the solid solution are of particular interest

- Sensor modeling and simulation including modeling and simulation methods for sensor selection and data validation approaches; and recent advances in micro/nano technology, embedded sensor systems, optical diagnostics, and multiparameter measurement technologies
- Sensor systems or approaches including embedded sensor systems enabled by advances in additive manufacturing
- Sensor systems associated with hybrid electric or all electric vehicle propulsion and vehicle systems
- Non-destructive evaluation techniques, particularly in-situ or non-disruptive evaluation techniques that complement advanced manufacturing methods
- Design and analysis methods, techniques, and tools to assess materials and systems produced using manufacturing methods described in this mission area, to include those that address service life, reliability and critical defects assessments
- Development of Lot Acceptance Test (LAT) methods to measure the burn rate and mechanical properties that are efficient and effective for materials produced by additive manufacturing
- Nuclear instrumentation sensors and sensor systems for monitoring the operational health of space-borne nuclear propulsion systems and provide critical inputs to control systems that would enable agile response to mitigate undesirable operational conditions

Mission Area VII:
System-wide Application of Additive Manufacturing for Propulsion Applications

This area focuses on the use of Additive Manufacturing (AM) as an enabling technology from both an organizational and a systems perspective. Additive manufacturing is critical for reducing manufacturing time and cost to produce specific components for propulsion systems, and multiple JANNAF Subcommittees are addressing the specific application challenges within their areas. Affordability is a critical element for both government and commercial systems. New and innovative manufacturing techniques are working their way into mainstream manufacturing. Before additive manufacturing is widely accepted for general use, it is necessary to understand the technology well enough to proceed with a high level of confidence. This Mission Area emphasizes how the various JANNAF organizations are planning to address the challenges of integrating AM into propulsion systems. What are the synergies between the JANNAF organizations' AM plans and the AM centers of excellence such as America Makes (as well as others)? How are the JANNAF organizations addressing the integration of AM hardware into existing or new systems? Other areas to consider are overall cost considerations and ROI when incorporating AM hardware into new systems.

Papers should address AM technology roadmaps (government, industry, AM centers), AM integration challenges, strategies for incorporating AM hardware into new or existing systems, and economic considerations.

Additive Manufacturing Technology:

- Government AM technology road maps/plans
- AM Centers of Excellence technology road maps/plans
- Industry AM technology road maps
- Synergy between roadmaps, what is missing?
- Challenges for incorporating AM hardware into systems
- Economic considerations of incorporating AM hardware into new systems
- Are we investing enough into AM?
- Are we investing in the right areas?

PIB

PROGRAMMATIC AND INDUSTRIAL BASE MEETING

JHU WSE ERG Technical Representative
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The JANNAF Programmatic and Industrial Base (PIB) Committee was chartered by the Department of Defense and the National Aeronautics and Space Administration in 2014 as a part of JANNAF. Its focus is on providing a mechanism for DoD and NASA Programs 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.

MSS

MODELING AND SIMULATION SUBCOMMITTEE

JHU WSE ERG Technical Representative
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The Modeling and Simulation Subcommittee (MSS) provides an overarching focus on M&S across all disciplines related to the JANNAF Interagency Propulsion Committee. Simulation-based acquisitions include propulsion systems for aerospace plane, hypersonic aircraft, rocket-based space-access systems, high-speed missiles, in-space propulsion systems, and gun propulsion systems. The MSS pursues this focus through Model-Based Engineering (MBE); Integrated Health Management; Simulation Credibility: Verification, Validation, and Risk; and Model Based Test and Evaluation. At the 21st MSS meeting, papers are sought to address specifics of the mission areas as described below. Questions about any of the MSS mission areas should be directed toward the JHU WSE ERG Technical Representative for MSS. **Misson areas and suggested paper topics are listed below.**

Mission Area I:
Model-Based Engineering

Model-Based Engineering (MBE) encompasses the development of methodologies, codes, and model simulations to quantitatively evaluate and optimize propulsion technologies across propulsion component, propulsion system, and vehicle system levels. The MBE mission area includes the specific discipline of Model-Based System Engineering (MBSE). MBSE is the formalized application of modeling to support system requirements, design, analysis, and verification/validation activities from conceptual design through later life cycle phases. The use of models complements traditional experimentation during technology development with a goal of reducing the development time and schedule. Development and usage of physics-based models allows exploration of domains

and behaviors that may be particularly difficult or impossible to examine experimentally. Statistical models provide an estimation of system sensitivities and uncertainties. Publications in the MBE area fall under two topic headings: Modeling Methodologies/Approaches/Tools and System Analysis Results.

Examples of topics of interest for the MBE mission area include the following:

- Modeling Methods/Approaches/Tools
  - » Proposed performance/loss models for rotating detonation rocket engines
  - » Ignition modeling
  - » Accommodating multidisciplinary modeling at multiple heterogeneous levels of fidelity
  - » Engineering decision support, including facilitating optimization, scheduling, and knowledge-based tool integration into the engineering process
  - » Advances in the development of models and methods for component modeling and simulations to aid propulsion design
  - » Improvements in commercial software which enable advanced MBE
  - » Challenges/boosts to using MBE under a more commercial/less centralized propulsion technology development paradigm and shifts from horizontal to vertical integration in the launch industry
  - » AI-based approaches for improving system modeling and design, including (but not limited to) learned reduced-order simulations, design optimizations, active learning for optimizing test case efficiency, differentiable simulations, and generative AI designs
- System Analysis Results
  - » M&S of vehicle system technology trades for space launch systems, prompt strike platforms, long-range ballistic missiles, cruise missiles, and hypersonic cruise vehicles
  - » Simulations, methods, and models to evaluate performance capabilities, cost, and reliability of systems
  - » Simulations, methods, and models to evaluate AI-in the loop vehicle systems
  - » Vehicle and launch facility, weapon and weapons platform, propulsion system and test facility simulations, interactions, and integration

Mission Area II:
Integrated Health Management

Integrated Health Management (IHM) promotes advancement and development of best practices of health management of propulsion systems within a “system of systems” environment. IHM technologies are focused on reducing maintenance and logistics costs, and increasing reliability of propulsion systems. IHM includes methods and tools for a variety of technologies: data management and mining; integrated communications, command and control; diagnostics; prognostics; and integrated sensors and sensing systems. These tools enable making redline and contingency decisions using knowledge-based expert systems; model-based diagnostic and reasoning using physics-based or advanced empirical models such as first-principles, fault models, machine learning and artificial intelligence (AI); neural networks, fuzzy logic, genetic and evolutionary algorithms; and life-cycle analysis. The advancement of the internet of things (IoT), digital twin and augmented reality (AR) technologies are key enablers for implementing IHM systems in propulsion systems.

Seeking papers on the following, with the intent to establish a valuable interchange of technical solutions:

- Condition evaluation of Propulsion Systems relevant to IoT and AR implementation challenges, successes, lessons learned and business case impact
- Digital Twin application examples and practices for propulsion systems supporting reliability or readiness

- Data Management and Mining: Advances in data mining, data fusion, machine learning, and statistics with applications to verification and validation of data, prognosis and diagnosis of system health
- Integrated Communications, Command and Control: architecture, theory, test beds, and demonstrations focused on vehicle health or reusability
- Diagnostic Systems: architecture, theory, simulations, and demonstrations of diagnosis of current state of health of propulsion and vehicle system, including in-place and depot-level non-destructive inspection methodologies
- Prognostic Systems: architecture, theory, simulations, and demonstrations of prognosis of future state of health of propulsion and vehicle systems; mitigation of, and recovery from, degraded system health to enable condition-based repairs and successful missions
- Integrated Sensors and Sensing Systems: diverse sensors and integrated sensing systems with broad applications to health and status monitoring of all vehicle types and methods for integrated sensing systems across multiple disciplines and end-use applications with an emphasis on measurement technology, smart sensors, test beds, application considerations, lessons learned, and sensor fidelity for condition-base maintenance (CBM+) of propulsion systems

Mission Area III:
Simulation Credibility: Verification, Validation, and Risk

The credibility of digital and analog simulations is a major issue for incorporating simulation tools and data into a technology-development program, for conducting simulation-based acquisition, for assessing system reliability to assure human safety and/or mission success, and for identifying and assessing risks in complex, technological systems. Simulation credibility includes assessment and management of computer simulation uncertainty, experimental uncertainty, verification and validation (V&V) of simulation models and of simulations, and risk assessment. Abstracts are solicited on technological advances in the following areas:

- Uncertainty quantification for experiments and simulations
- Validation of models and verification of simulations
- Propagation of uncertainty
- Risk assessment and management
- Recommendations for guidelines, procedures, or standards

Mission Area IV:
Model Based Test and Evaluation (MBTE)

Model Based Test and Evaluation (MBTE) investigates the design, development, and use of different types of models (e.g., logical, physical, virtual, etc.) to complement physical testing of propulsion systems. MBTE technologies are expected to increase the linkages between test models and systems under test (SUT), facilitate a higher degree of test process automation (e.g., reporting), and provide greater accuracy regarding predicted results of test through the use of high-fidelity physics based models, virtual prototypes, and digital twins. In addition, MBTE seeks to ensure full connectivity of the digital thread from requirements through testing. The goal is to test early and allow for models to evolve over time to become accreditable artifacts that can be used to statistically quantify MOPs for requirements, eventually pairing the analytical models with data from physical testing to ensure validation of the model that represents the SUT.

The following topics represent strong alignment with this mission area:

- Model-Based Test Engineering: Test methodologies using models to capture requirements, behavior, structure, and functionality of propulsion SUTs and/or associated propulsion test infrastructure

- Data Architecture and Modeling: Models used to define, develop, and deploy propulsion test and evaluation data pipelines for process automation and improved data analytics. This includes frameworks and physical infrastructure definitions needed for implementation of MBTE
- References & Standards: Definition and development of model-based plans, processes and procedures used to streamline propulsion test and evaluation
- Reality Capture: High-resolution models used to represent test equipment, test fixtures, test facilities, and test installations used for propulsion test and evaluation
- Modeling Simulation and Analyis (MS&A): High-fidelity physics-based models used to represent real-world phenomenon associated with propulsion SUTs and/or associated propulsion test infrastructure
- Digital Twins/Digital Threads: Application models and software developed to serve as digital twins and associated digital threads for propulsion SUTs and/or associated propulsion test infrastructure
- Virtual Prototype Testing: Model-based tools and techniques to support virtual experimentation and testing of propulsion SUTs
- Machine Learning and Artificial Intelligence (ML/AI): Application of machine learning algorithms and artificial intelligence frameworks to optimize test matrix design, predict complex propulsion system failure modes, accelerate high-fidelity physics-based simulations, and automate anomaly detection and calibration of digital twins

Mission Area V:
Energetics Modeling and Simulation

The modeling and simulation of energetic systems for reliability, survivability, and lethality performance requires the use of specialized codes, referred to as hydrocodes, for predicting high strain rate behaviors such as detonation, fracture/fragmentation, and shock propagation. This mission area will serve as a platform for sharing insights, discussing specific hydrocode solutions, and exploring best practices for their application in weapon system performance and lethality analysis. The ultimate aim is to improve and modernize hydrocode modeling, ensuring that all parties collaborate effectively to refine existing models, address emerging challenges, and determine which codes are best suited for specific problems.

Topics of interest to the Hydrocode Modernization mission area include:

- Modeling methods for aluminized and non-ideal explosives
- Modeling methods for predicting natural fragmentation of warhead cases
- Material model parameterization methods for reactive flow models, strength/constitutive models, equations of state, fracture models, etc.
- Numerical methods for weapon effects and performance simulations
- Approaches for improved computational efficiency
- Modeling techniques for insensitive munition (IM) performance assessments for both warheads and rocket motors
- Methods for developing fast-running or engineering-level models using information from high-fidelity, physics-based simulations

LIQUID PROPULSION SUBCOMMITTEE

JHU WSE ERG Technical Representative
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The JANNAF 16th Liquid Propulsion Subcommittee meeting will include sessions in six general technical areas: liquid engine systems; liquid combustion subsystems and components; liquid propellant feed and pressurization systems; advanced materials for liquid propulsion applications; rotating detonation rocket engines; and propulsion-induced environments and structural and thermal loads. Papers are solicited that will aid in the design, development and test of efficient and stable liquid propulsion systems. Please contact the JHU WSE ERG Technical Representative for LPS with questions about the LPS mission areas.

Mission Area I:
Liquid Engine Systems

System Models and Data Integration: Analytical tools, system models, and methodologies that support digital engineering throughout the liquid engine lifecycle. Specific interest in analyses or data integration that enable greater comprehension of system interactions and dependencies; Model-Based Engineering (MBE) architectures; design verification and traceability; risk and margin management; test data analysis; and prediction of integrated-system performance, mass, and cost.

Operability, Serviceability, and Reusability: Research associated with rapid operations, maintenance, and increased asset life. Architecture Con-Ops, functional analysis, and designs that improve the efficiency of launch operations or develop a capability for in-space operations.

- Operability and Serviceability - technologies and designs that increase automation, provide resilient/launch-on-demand capabilities, or enable use over a wider range of launch environments and applications. This can include technologies to address rapid or minimized cleaning/inspection, integrated diagnostics, ability to field remove-and-replace, or approaches to improve launch availability.
- Modularity - Engine architectures, technologies, and designs that increase the applicability of unique propulsion systems across small, medium and large launch vehicles (scalability), applicability to various mission sets (Commercial launch, Rapid Launch, etc.). Furthermore, approaches to dramatically reduce development timelines and amortize cost by increasing economies of scale of liquid rocket engines.
- Reusability - Engine designs for high-rate flight operations, long in-space missions; 25+ engine firings, refueling operations, system diagnostics, and servicing of critical components.

Liquid Engine Systems for Launch Stages, Orbital Transfer Vehicles, and Landers: Design, development, test, and evaluation approaches for liquid propellant rocket engines applicable landers, launch vehicle stages, nuclear-thermal propulsion systems, and orbital transfer vehicles. Topics of interest include reliability, fabrication, testing, operations, and the affordable integration of these areas. Particular focus areas include autogenous pressurization, deep throttling capability, cryogenic reaction control systems (RCS), wireless instrumentation and controls, and cryogenic fluid management for in-space applications. Strategies for integrated stage testing, flight testing, and flight system certification are also relevant. For human-rated systems, additional emphasis is placed on functional requirements, design modifications, and advanced fabrication, assembly, and inspection methods. Approaches for meeting government (NASA, FAA, and OCST) safety and reliability requirements—such as fault tolerance, fault detection, isolation, and recovery, crew interaction, reliability modeling, and qualification/certification testing—are of particular interest. Applications span commercial space, NASA and USSF specific mission systems, Lunar and Mars landers, and in-space transportation architectures requiring efficient cryogenic propellant handling.

Liquid Rocket Engine (LRE) Development History: Papers addressing the important processes which LRE have gone through in the course of their development. Particular subjects of note are successes, failures, mishaps, and lessons learned. Topics can be detailed in their information or can provide a general overview of the program. Papers are not limited to flight systems; testbeds, proof-of-concepts, and R & D programs are encouraged as well.

Test Practices, Standards, and Facilities: Industry-consensus best practices and standards for the test and evaluation of liquid engines, components and propulsion/vehicle interaction. Status, capabilities, and operation of government and commercial rocket engine test facilities. This includes training, problem reporting, failure investigation, lessons learned, safety, FOD control, process control, and infrastructure improvements to meet aggressive technical goals. Concepts and innovations for engine life testing, engine fault detection, flight qualification testing practices, data reduction and uncertainty analysis methodologies, and other test needs to meet future demands are of interest.

Mission Area II:
Liquid Combustion Subsystems and Components

Thrust Chamber Assembly (TCA) Design and Applications: This mission area addresses the components and subcomponent features required in all sizes of liquid rocket engines. Components include main combustion chambers, preburners, gas generators, nozzles, high temperature nozzles, and their subcomponent features including items such as injectors, stability aids, and coolant passages. Papers on combustion devices are being sought that cover all aspects of design analysis, component test results, test rig development, diagnostic techniques, and novel design features that are being made possible by manufacturing advances.

Hydrocarbon Fuel Properties, Performance, and Specifications and Processes: Papers addressing chemical composition, physical properties, fit-for-purpose quality, cooling and combustion performance, and specification for various hydrocarbon fuels, including RP-1/RP-2, methane and LNG, and JP-10 or other high energy density propellants; experimental and numerical efforts to characterize operational performance of these fuels in terms of cooling, combustion, and other application-specific processes.

Combustion Stability: Papers addressing design and performance challenges, modeling and simulation techniques, and scaling methods associated with combustion stability in main combustion chambers, preburners, and gas generators for all sizes of liquid rocket engines.

Liquid Injection Systems: The injection system of liquid rocket engines is critical to system performance. This mission area seeks papers describing new injector concepts, the physical processes required to understand injection concepts (including supercritical jets, sprays, and droplets), and methods to determine injector performance and stability.

Modeling and Simulation: Recent advances in modeling and simulation bring forward new capabilities to performance prediction and design of combustion devices. Papers are sought that look at the recent developments, new techniques, results of implementation or comparison with tests. Aspects covered include, but are not limited to: integrated models, injector element dynamics, hot gas flow fields, heat transfer, cooling mechanism, modeling of conventional and novel additively manufactured design features relative to coolant passages, hot wall features, injectors, etc.

Advanced Liquid and Gel Propellants: Papers are sought addressing advanced liquid and gel propellants and the development of supporting technologies such as “green” propellants, storable oxidizers such as high-test peroxide (HTP), fuel management systems, and lightweight tankage systems to advance state-of-the-art chemical capabilities.

Hybrid Rocket Engines: Papers addressing hybrid rocket engine systems and the combustion process in these systems.

Mission Area III:
Liquid Propellant Feed and Pressurization Systems

Turbomachinery Design and Applications: Turbopump-fed liquid rocket engine systems require the use of high-speed and high-performance rotating machinery. Turbomachinery for this application requires support from a wide range of technical disciplines. Technical areas typically considered include the design, analysis, and testing of inducers, impellers, turbines, seals, bearings, and structural elements. Papers on liquid rocket engine turbomachinery are being sought that cover all aspects of design, analysis, code development, component test results, test rig development, diagnostics techniques, and system level testing.

Pressurization and Feed Subsystem Design and Applications: This area covers all aspects of design, analysis, and testing of the propellant feed system and engine system specific elements. The propellant feed system is composed of tanks, major component lines, pressurization systems, ducts, feed system control valves, and suppression systems. Engine system specific elements include ducts, flow measurement devices, and valves. Papers are being sought which address design, analysis, tool development, diagnostics techniques, and testing of propellant feed system elements and engine system-specific elements.

Electric Pump Systems: Advances in battery technology and electric motor technology have made it possible to use electric motors to drive propellant pumps. Electric pump systems have applications in rocket engines and propellant feed systems. Papers on electric pump systems are being sought that describe the unique flight system requirements, architecture, and design constraints. Papers encompassing all aspects of the pump design, analysis, control system design, component test results, test rig development, diagnostics techniques, and system level testing are also encouraged.

Mission Area IV:
Advanced Materials for Liquid Propulsion Applications

Material Applications in Liquid Rocket Engines: Papers are sought addressing advanced materials and processing for liquid rocket propulsion systems, including the following eight areas:

1. **Material technologies resulting in significant thrust-to-weight ratio increases and/or performance advantages over state-of-the-art capabilities**
    - » Lightweight, high-temperature nozzle materials
    - » Polymer matrix composites (PMCs) for lightweight components and structures
    - » PMC resin development for high-temperature or cryogenic environments
    - » Materials for lightweight lines, ducts, valves, and tanks
    - » Metals, ceramics, and composites for component applications
    - » Advanced copper alloys, refractory metals, superalloys, intermetallics, and multi-material architectures for liquid propulsion components
    - » Materials and production methods for lower lifecycle costs
    - » Near net shape production for components and structures
    - » Modeling of materials and components for liquid rocket engines (physics-based models, machine learning predictive models, digital twins)

2. **High-Temperature Materials and Materials for Extreme Environments:** Materials and material systems capable of reliable operation in the combined thermal, mechanical, chemical, and environmental conditions encountered in advanced liquid propulsion systems. Papers are sought addressing:

   - Materials for high heat flux, extreme temperature, high-pressure, and severe thermal-gradient environments
   - Refractory alloys, oxide dispersion strengthened alloys, UHTCs, CMCs, carbon-carbon, and other materials for hot-gas-path components
   - Thermal shock, thermal fatigue, creep, fatigue, fracture, and damage tolerance under propulsion-relevant conditions
   - Oxidation-, corrosion-, erosion-, and ablation-resistant materials and coatings
   - Thermal barrier coatings (TBCs), environmental barrier coatings (EBCs), bond coats, diffusion coatings, and other surface-engineered systems
   - Material behavior in oxygen-rich, hydrogen-rich, fuel-rich, reducing, oxidizing, and combustion-product environments
   - Materials for extreme cryogenic conditions, including thermal contraction, cryogenic embrittlement, repeated thermal cycling, and long-duration storage
   - Materials exposed to vacuum, radiation, atomic oxygen, plasma, or other space environments
   - Joining and interface technologies for dissimilar materials, including metal-ceramic, metal-composite, and coating-substrate interfaces
   - Advanced cooling concepts and materials for high-temperature thrust chambers, nozzles, turbines, injectors, and hot-gas valves

3. **Materials for Commercial and Reusable Space Transportation:** The rise in commercial space transportation has created the need for low-cost, high-performance material solutions for a new generation of space vehicle engines. Papers are sought addressing areas such as:

   - Materials selection criteria and characterization requirements for high-cycle and extended-life
   - Flight qualification standards for materials and certification approaches for new materials and processes
   - Risk management related to materials selection
   - Non-destructive evaluation and inspection for reusable components
   - Damage tolerance and repairability of reusable hardware
   - Data-driven life prediction and health monitoring

4. **Heavy Lift Launch Vehicles:** A need for heavy lift launch vehicles has been identified for future space exploration and other missions. Such a launch vehicle will likely require engines in the 1 million pound thrust class as well as smaller upper stage and other liquid-fueled engines. Papers are sought addressing materials and processes for:

   - Manufacturing and production of new liquid fueled engines
   - Integrated health management for materials and structures
   - Lightweight tanks and composite ducts
   - Materials for reusable engines
   - Concepts for material solutions that optimize the entire propulsion system for improved performance

5. **Nanotechnology for Liquid Propulsion Systems:** Application of new nanomaterials to liquid propulsion systems. Papers are sought to address:

   - Nanomaterials and nano processing to improve strength, conductivity, density, modulus, and other properties
   - Nanostructured thermal barrier, environmental barrier, wear-resistant, and oxidation-resistant coatings
   - Self-healing materials, adaptive structures, and materials incorporating damage-mitigation capabilities
   - Manufacturing, scale-up, repeatability, and quality control for nanostructured propulsion materials
   - Concepts of how to integrate nanotechnology into future liquid-fueled rocket engines
   - Nanotechnology areas that may have high payoffs for liquid rocket engine systems

6. **Materials for Low Toxicity Fuel Engines:** new engines utilizing fuels such as methane and ethanol are in use or proposed. Methods to address the compatibility of these fuels and their combustion products with current and potential future engine materials are needed. Papers are sought to address:

   - Environmental corrosion, stress-corrosion cracking, erosion, and compatibility issues associated with fuels and combustion products
   - Compatibility test methods (cryogenic compatibility, thermal cycling, phase-changes, and long-duration exposure)
   - Compatibility of materials, lubricants, seals, coatings, and joining systems with hydrogen, methane, oxygen, and other propellants
   - Hydrogen compatibility (embrittlement, hydrogen assisted cracking) and mitigation
   - Oxygen compatibility
   - Materials concepts for future low-toxicity fueled engines
   - Concepts for future engines and materials for them

7. **Turbomachinery Materials:** Turbomachinery requires new materials or coatings to address challenges (such as chemical and temperature environments of oxygen-rich staged combustion and other high-performance cycles where operating conditions are considerably different than prior expander or gas-generator cycles. Papers are sought to address potential issues such as:

   - Hydrogen and oxygen compatibility, including testing for oxygen promoted combustion and hydrogen embrittlement
   - Advanced nickel-based superalloys, cobalt-based alloys, refractory alloys, intermetallics, and CMCs for turbine and pump components
   - Thermal barrier coatings, environmental barrier coatings, wear-resistant coatings, and multilayer coating systems
   - Development, processing, and joining of new turbomachinery materials
   - Materials qualification and acceptance criteria in turbomachinery for hydrogen-, hydrocarbon- and low-toxicity-fueled engines

8. **Additive Manufacturing:** Processing methods using additive manufacturing techniques and other three-dimensional rapid prototyping methods that offer potential for reduction of times to produce parts, cost savings, and increased part complexity, such as:

   - Laser powder bed fusion and electron beam powder bed fusion, including L-PBF, SLM, EB-PBF, and EBM
   - Directed energy deposition, including laser and wire-arc processes

- » Binder jetting for complex geometries and multi-material systems
- » Cold spray additive manufacturing for repair, restoration, and coating applications
- » Hybrid manufacturing combining additive and subtractive processes
- » Powder development and reusability/recyclability
- » Post-processing techniques, including hot isostatic pressing (HIP), heat treatment, machining, surface finishing, and coating
- » Non-destructive evaluation methods specific to additive-manufactured components, including computed tomography, ultrasonic testing, thermography, and other techniques
- » Design for additive manufacturing, topology optimization, lattice structures, and performance-based design
- » Material qualification and certification frameworks for flight-critical additive-manufactured components
- » Supply-chain considerations, distributed manufacturing, digital thread implementation, and configuration control
- » Approaches for acceptance and certification of additive-manufactured materials, processes, and flight systems

Mission Area V:
Rotating Detonation Rocket Engines

RDRE Thrust Chamber Assembly (TCA) Design and Applications: This mission area addresses the components and subcomponent features required in all sizes of RDREs. RDRE components include main combustion chambers, preburners, gas generators, nozzles, high-temperature nozzles, and their subcomponent features including items such as injectors and coolant passages. Papers are sought on rotating detonation combustion devices, including:

- Unsteady RDRE combustor/nozzle design analysis and simulations for gaseous and multiphase rocket propellants
- Compatible materials for the unique unsteady supersonic environment
- Component test results
- Test rig development
- Diagnostic techniques and sensors
- State of the art RDRE modeling simulation techniques for analysis/design of these systems
- Reduced order modeling approaches for optimizing RDRE performance and design

RDRE Test Practices, Standards, and Facilities: Industry-consensus best practices and standards for the test and evaluation of rotating detonation rocket engines, components, and propulsion/vehicle interfaces. Papers are sought on state of the art in RDRE testing, including:

- Status, capabilities, and operation of government and commercial RDRE test facilities
- Innovative concepts for RDRE testing, data reduction, and model validation
- RDRE testing uncertainty analysis methodologies

Mission Area VI:
Propulsion-Induced Environments and Structural and Thermal Loads

This area focuses on propulsion-induced environments and the associated loading of a physical structure or material within the surroundings. Fundamentally, an “environment” represents a source of loading. The sources

may be pressure, thermal, thrust, acceleration, or other type of loading. The physical structure may be a launch vehicle, spacecraft, lander, payload, crew, surrounding structure, ground, or other object or material; these are loosely grouped in the summary below as "launch vehicle and surroundings". While many environments occur during the liftoff phase or landing phase, propulsion-induced environments during the entire mission should not be excluded from this area. The subject area is split into two focus areas—Propulsion-Induced Environments and Structural and Thermal Loads—however, this does not exclude many examples where two-way coupling occurs between the source and the structure.

Propulsion-Induced Environments: Modeling, Analysis, Testing, Design, and Validation. Launch vehicles and surroundings are subjected to environments that are induced by propulsion systems. This focus area encompasses the environment and includes analytical and computational tools, models, forcing function definitions, testing, methodologies, validation, physical processes, and mitigation approaches that support propulsion-induced environments.

Examples of propulsion-induced environments are not limited to this list: Liftoff/Landing Acoustics, Engine and Booster Ignition Overpressure, Liftoff Debris Transport, Excess Hydrogen Pop, Thrust Oscillations, Hold-down Acoustics, Engine Nozzle Flow Transient Acoustics, Booster Igniter Shock and Throat Plug Expulsion Overpressure, Infrasonic Acoustics, Far-field Acoustics, Plume Impingement, Plume-Induced Thermal Environments, Emissions, Propulsion Noise Sources, Propulsion Blast, and Plume-Surface Interaction.

In general, most of the environments listed above produce direct pressure, thermal, or acceleration loading and are relatively unambiguous in the environment it produces. However, several examples are not as evident and are described here. Plume-Surface Interaction is an interaction between the environment and the structure but is listed in Propulsion-Induced Environments rather than Structural and Thermal Loads for simplicity. In Plume-Surface Interaction, the plume imparts pressure loading, thermal loading, or other environment onto a physical structure or material such as concrete or soil. Physical processes associated with plume-surface interaction could result in pyrolysis and melting, ablation and erosion, and fracture and spalling of material, soil, or regolith. Debris transport and soil particulate impingement to vehicle and surroundings at liftoff and landing can contribute to detrimental loading in the form of impact energy. Emissions or dust can be hazardous to the personnel or to the environment. There are also examples of two-way coupled phenomena such as Slosh and Pogo. In the context of a propulsion-induced environment, a thrust imbalance may contribute to slosh, however the fluid would subsequently impart a pressure on the tank wall relevant to tank design or contribute to a change in mass distribution relevant to vehicle control. And while Pogo is generally recognized as an instability, there are technical aspects and physical processes that fall within this area regarding coupled fluid-structural interaction induced by the propulsion system. Finally, as an example environment mitigation approach, design and analysis activities of the ground system are captured in this area—such as water suppression systems, hydrogen burn-off systems, and appropriate aspects of launchpad design.

Structural and Thermal Loads: Modeling, Analysis, Testing, Design, and Validation. Launch vehicles and surroundings are subjected to environments that are induced by propulsion systems. This focus area encompasses the structural and thermal response to these environments and includes analytical and computational tools, models, testing, methodologies, validation, physical processes, and mitigation approaches that support structural and thermal loads.

Propulsion-induced environments such as dynamic pressure loading are principal sources of structural vibration which may result in the malfunction and fatigue of launch vehicle and surroundings. Pressure loading from the propulsion-induced environments on the external surfaces of a vehicle can damage the vehicle, give rise to sound pressure levels inside a payload cabin which can damage payloads, or inside a crew cabin which may impact crew health, safety, or ability to communicate. Other propulsion-induced environments also contribute to stress and failure of vehicle hardware and surroundings.

SPACECRAFT PROPULSION SUBCOMMITTEE

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The 14th SPS meeting seeks abstracts on the full array of spacecraft propulsion technology interests including chemical propulsion, electric propulsion, micropropulsion, nuclear thermal propulsion, propellant management, aerocapture, solar sails, solar thermal propulsion, tether systems, in-space propulsion infrastructure, and technologies for the future. Possible applications to these technologies are orbit to orbit transfer, attitude control, non-terrestrial ascent/descent, station keeping, deep space, formation flying, drag makeup, and orbital rephasing. Please direct questions about the SPS mission areas to the JHU WSE ERG Technical Representative for SPS.

Mission Area I:
Chemical Propulsion

Papers are invited that cover all areas of chemical propulsion including monopropellant, bipropellant, gel, solid, and hybrid chemical propulsion systems. Some current areas of interest include, but are not limited to, advanced propellant formulations and propulsion system developments for modern spacecraft and new missions.

Decreased toxicity monopropellant thruster technology development has been of primary interest for spacecraft applications in the last decade. Monopropellant technology is of critical importance to spacecraft operations and principally relies upon catalyst technology.

New propulsion system architecture approaches and technology demonstrations that are being pursued to reduce cost, expand capabilities, and enable new missions are also of significant interest. Also, reuse or modification of existing propulsion systems and components has been an ongoing and emerging area of development where publications are sought. This includes the reuse of heritage components and developments in reusable vehicles, systems, or components.

Increasing community knowledge of lessons learned and the relative impact of forthcoming technologies and approaches will support the transition and evolution of these propulsion approaches. Papers are solicited on the following topics of particular interest for sessions supporting spacecraft chemical propulsion:

Propellant Factors -

- Propellant physical property characterization
- Formulation, pre-cursor considerations, synthesis, and quality control measures
- Propellant advantages, disadvantages and their impact to operations (ground and flight)
- Propellant (decreased toxicity and state of the art) storage and management
- Decomposition, kinetics, and combustion environment impact to materials and duty cycle
- Impact of propellant impurities on performance including catalytic life

Thruster / Engine / Component Factors -

- Impact of propellant impurities on delivered performance including catalytic and non-catalytic reactor performance and life

- Injection technologies and concerns such as propellant atomization or dispersion, including impacts of non-volatile residue accumulation factors and irregular feed
- Decomposition and ignition means for all areas of chemical propulsion including:
  - » Development and performance of alternative catalysts, substrate, and active materials with respect to response and life limiting factors
  - » Augmented catalytic and non-catalytic decomposition for monopropellants
- Developments and issues in the reuse, modernization, and/or requalification of components
- Integrated performance and operations including:
  - » Duty and thermal cycle impacts to response, repeatability, and useful life
  - » Relationship of propellant conditions, component design, and ignition factors
  - » Relationship of propulsion system conditioning requirements by mission
  - » Effectiveness in modeling variation of performance for system design and mission planning

System / Mission Factors -

- Throttleable and pulsed system delivered performance including combustion stability effects
- Propulsion system architecture considerations, configuration trades, and mission optimization
- Propulsion system operations, diagnostics, and failure management
- Operational condition concerns such as conditioning of propellants and testing of environments
- Status, infusion viability, and impact of new propulsion technology and pathfinder activities

Mission Area II:
Electric Propulsion

Papers are invited in all areas of electric propulsion (including solar- and nuclear-powered systems). Topics of interest include:

- **Basic Research and Development of Electric Propulsion Thrusters:** This includes physics of electric propulsion processes, thruster technology development, advanced and breakthrough concepts, high-power electric propulsion, hybrid and dual-mode systems using electric propulsion, alternate propellant research, laboratory plasma diagnostic techniques, and electric propulsion ground test facilities effects.
- **Systems Engineering of Electric Propulsion Subsystems:** This includes electric propulsion subsystem design, propellant storage and feed systems development, power processing units design and testing, integrated system testing of electric propulsion subsystems, and assessment/mitigation of electric propulsion system interactions with spacecraft electrical and telemetry subsystems.
- **Electric Propulsion Flight Programs and Mission Studies:** This includes reporting on: flight electric propulsion hardware development; ground and flight system operations; space qualification programs; flight plasma diagnostics development and experiments; in-flight programs status; electric propulsion mission studies for commercial, science, and human exploration space missions.
- **Molecular Propellant Research:** This includes submissions for propulsion technologies able to satisfy new mission demands for spacecraft operation in very low Earth orbit (vLEO) and/or multimode propulsion systems using chemical propellant exhaust or decomposition byproducts.
- **Electric Propulsion Modeling and Simulation:** This includes computational models of thruster physics, new innovative numerical methods to improve accuracy and/or computational speed, development of robust model validation techniques, and plasma diagnostics. Investigations of electromagnetic and electrostatic thrusters, ground facilities effects, and plume interactions with spacecraft are all welcome.

Mission Area III:
Micro / Nano Spacecraft and MicroNewton Propulsion

Papers are invited to discuss micro-propulsion topics for microsats, nanosats, and large spacecraft. Concepts, designs, and mission applications for such propulsion systems or components of such are of interest. Propulsion technologies include chemical, electric, hybrid, and propellantless systems. Topics include:

- Micro and nano spacecraft propulsion systems and components
- Micronewton thrust devices
- Innovative fabrication or assembly approaches, especially to reduce costs and to improve manufacturability and reliability
- Propulsive applications or mission design studies
- System-level integration studies or testing
- Space flight qualification or flight programs
- Flight demonstrations and lessons learned
- Technology development and mission infusion roadmaps

Mission Area IV:
Future Technologies

Papers are invited for a range of advanced future space propulsion technologies, including but not limited to the following listed areas. In addition, there will be panel discussions focused on the findings of recent AFRL and NASA NEP design studies. Several design reference missions and their NEP system requirements will be discussed. Authors and stakeholders are encouraged to submit papers in these areas, especially sharing not only the results and status of the investigations but also the lessons learned and recommendations for paths forward.

Nuclear Thermal Propulsion (NTP) and Nuclear Electric Propulsion (NEP) design, testing, and utilization for future human and unmanned exploration missions of the solar system, including:

- NTP and NEP spacecraft and mission design for human and unmanned exploration missions
- Solid core NTP concepts with or without bimodal (power generation) capability
- Common reactor design for nuclear propulsion (NTP and NEP) and nuclear fission surface power generation
- Candidate nuclear fuel options
- Reactor controls and shielding
- NTP and NEP assembly, integration, and test methods and facilities
- NTP and NEP demonstration options
- Safety, reliability, risk analysis, and crew-rating
- NTP and NEP vehicle operations and costs
- Planned and/or funded missions
- Near-term mission concepts
- Innovative system or subsystem designs

Advanced concepts for both near- and far-term future space propulsion focusing on technologies that promise significant gains in specific impulse, and/or power density, but are based on known fundamental physics, such as:

- Fusion-based in-space propulsion systems including conventional magnetic, inertial, and inertial electrostatic confinement schemes; magnetically insulated inertial fusion; fission-fusion hybrid systems; and concepts that directly or indirectly utilize fusion reactions, directly or indirectly
- Beamed propulsion schemes, including laser or microwave-based propulsion
- Solar sail propulsion, electrodynamic and momentum exchange tether propulsion, and other innovative technologies that use the natural environments of space to derive propulsion without the expenditure of conventional propellant

POSTERS

POSTER SESSION INFORMATION

For the May 2027 Meeting, abstracts for poster presentations may be submitted by any interested author, including those considered Early Career professionals. The poster session will take place on **Tuesday, 18 May** at the Huntsville Marriott at the Space and Rocket Center and will be open to all meeting attendees. All Posters must be unclassified and suitable for public release or approved for presentation at distribution statement C/CUI/FEDCON. Authors of abstracts selected for Poster presentations have the option of providing a paper.

Early Career Posters

JANNAF is interested in offering more opportunities for Early Career Propulsion and Energetics professionals to engage with one another and the overall JANNAF community. In order to be considered an Early Career professional, at least one of the following criteria must apply to you:

- A student
- Working in the field for less than five years
- Have obtained your Doctorate within the last five years

If you meet the above criteria of an Early Career professional, you are eligible to submit a poster abstract for any of the subcommittees listed on pages 7–27. When submitting, choose “Early Career Poster” in place of selecting a Mission Area within your preferred subcommittee.

General Posters

Authors interested in presenting a Poster who do not meet the JANNAF definition of Early Career have the option of selecting “General Poster” in lieu of choosing a Mission Area when submitting an abstract. The preferred subcommittee must first be selected so that the identified subcommittee is assigned the Poster abstract for review.

Visit the Poster Information page for additional details.

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 **Friday, 13 November 2026**.

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.

The form to request a workshop can be found on the Workshop and Specialist Session Guidance page. Submit the form to your JHU WSE ERG Technical Representative (see pages 7–27 for contact information) or the JANNAF Meeting Planning Team at meetings@erg.jhu.edu. This form must be submitted to ERG by **Friday, 13 November 2026.** The agenda and invitation list is due **Friday, 5 February 2027** for inclusion in the Preliminary Program, and must be approved no later than **Friday, 19 March 2027** 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. The presentations from specialist sessions may or may not be published as part of the meeting proceedings at the author's discretion. Publication can include an executive summary authored by the session chair if desired.

The form to request a specialist session can be found on the Workshop and Specialist Session Guidance page. 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 **Friday, 13 November 2026**, and forms must include a 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, 5 February 2027**. 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, 19 March 2027**. If you have any questions about planning a specialist session please contact your JHU WSE ERG Technical Representative (see pages 7–27 for contact information) or the JANNAF Meeting Planning Team at meetings@erg.jhu.edu.

BEST STUDENT PAPER AWARD

The Best Student Paper Award will be given to an undergraduate or graduate student who authors a paper that exhibits excellence and significant merit. One paper will be selected to receive this award, which will be presented at the JANNAF meeting at which the paper is given. To be eligible for consideration, a student must be the paper's primary author. The paper and its signed and completed JANNAF Publication Clearance Form must be submitted to JHU WSE ERG by **Friday, 12 March 2027**. Please indicate within the abstract submission if you wish to be considered.

Student authors must conform to the same JANNAF eligibility requirements as other authors, per the policy on non-government attendees (see page 4), and are encouraged to work with their advisors to ensure they meet these requirements before registration opens. For student eligibility and participation questions, contact Mionna Sharp (msharp@erg.jhu.edu).

More information about JANNAF Awards can be found on pages 15–17 of the JANNAF Technical Committee Manual.

UPCOMING JANNAF MEETINGS

54th Combustion
42nd Airbreathing Propulsion
42nd Exhaust Plume and Signatures
36th Energetic Systems Hazards
Joint Subcommittee Meeting
Programmatic and Industrial Base Meeting

7–11 December 2026
Hampton, Virginia
Visit the December 2026 meeting website

74th JANNAF Propulsion Meeting
Programmatic and Industrial Base Meeting
21st Modeling and Simulation
16th Liquid Propulsion
15th Spacecraft Propulsion
Joint Subcommittee Meeting

17–21 May 2027
Huntsville, Alabama
Visit the May 2027 meeting website

51st Structures and Mechanical Behavior
47th Propellant and Explosives Development and Characterization
36th Safety and Environmental Protection
4th High Temperature Material Applications
Joint Subcommittee Meeting
Programmatic and Industrial Base Meeting

6–10 December 2027
Location TBD