HTSC

HYPERSONIC TECHNOLOGY & SYSTEMS CONFERENCE

25 - 28 AUGUST 2025
EAST COAST

CALL FOR ABSTRACTS

ABSTRACT DUE DATE: 19 MARCH 2025

We invite you to participate in the seventh annual Hypersonic Technology & Systems Conference (HTSC) taking place on the East Coast on 25 - 28 August 2025. The specific location will be announced in early January.

Sustained hypersonic flight within atmosphere has substantial utility. Advances in underlying technologies and integration into weapon systems offer the DoD significant enhancements in its ability to penetrate heavily defended areas and prosecute time-critical targets. Other nations are also actively pursuing these technologies; as such, defense against these systems is also of increased interest. The technologies required to enable the reliable use of hypersonic vehicles are multi-disciplinary. Some of the technologies that HTSC focuses on include:

- Thermal Management Systems
- Propulsion
- Aerodynamics & Aerothermodynamics
- Navigation, Guidance & Control, and Electrical Systems
- Programmatic Review
- Defense Against Hypersonics Across the Kill Chain
- Detecting & Tracking Hypersonic Objects
- Sensing & Communications in a Hypersonic Environment
- Ground Test Campaigns & Facilities
- Systems Engineering
- Flight Experimentation & Testing
- Mission Planning & C4ISR (Offense & Defense)
- Weapon Effects & Lethality
- Modeling & Simulation, Analysis, and Design

HTSC's emphasis is on systems and applied technology. This conference highlights the nation's investments in systems integrated hypersonic technologies for both research and development and weapon platform integration for offense and defense. It brings together the best and brightest involved in the development and use of hypersonic technologies in a unique, limited-attendance forum which will facilitate knowledge sharing and collaboration opportunities.

HTSC receives technical guidance from the following organizations:

- » Air Force Institute of Technology
- » Air Force Research Laboratory
- » Army Combat Capability Development Command Aviation & Missile Center
- » Army Engineer Research and Development Center
- » Arnold Engineering Development Complex
- » The Boeing Company
- » CUBRC, Inc.
- » Defense Advanced Research Projects Agency
- » Georgia Tech Research Institute
- » Innovative Employee Solutions, Inc.
- » The Johns Hopkins Applied Physics Laboratory
- » Leidos
- » Lockheed Martin Corporation
- » Missile Defense Agency
- » MIT Lincoln Laboratory
- » NASA Langley Research Center
- » National Geospatial-Intelligence Agency
- » Naval Surface Warfare Center
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- » Parallax Advanced Research
- » PeopleTec, Inc.
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- » RTCS, LLC
- » Sandia National Laboratories
- » Texas A&M University
- » U.S. Space Force

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TO SUBMIT YOUR ABSTRACT, VISIT https://www.usasymposium.com/Hypersonics/cfa.php

We look forward to receiving your abstract(s) for the 2025 HTSC. This event is conducted at the SECRET//NOFORN level. Attendance is limited to U.S. citizens with a final SECRET clearance. Final presentations may carry A, C, or F (with program management approval) distribution levels.

ABSTRACT & SUBMISSION REQUIREMENTS CHECKLIST

IMPORTANT: Speed up your organizational release process of your abstract by letting your approvers know that abstracts will not be published on the web, nor will they be distributed beyond the technical selection committee.

- ❑ **Abstracts must be unclassified.** If appropriate, be sure to have your derivative classifier do a sanity check on your unclassified abstract prior to submitting it. Please keep in mind that you are beholden to the classification guide your material falls under.
- ❑ Abstracts **must** carry a distribution level of A or C. If your presentation material is not derived from work done under DoD funding or oversight, please use your organization's equivalent to the distribution levels below.
  - ❑ A = Approved for public release, distribution unlimited
  - ❑ C = U.S. Government Agencies and their contractors only
- ❑ If you find it impossible to submit a worthwhile abstract at the unclassified level or at the Distro A or C level, please contact Michelle Williams at mkw@blue52productions.com for alternative options.
- ❑ When you upload your abstract, please **do not** password protect your file. The submission site is cleared for CUI and has end-to-end encryption with a security scan upon upload. If you submit a file that is password protected, **it will not upload** and your form will not submit.
- ❑ Abstracts should be no more than 400 words long.
- ❑ Abstracts **must** contain the title of your abstract in the body of the submission and proper CUI markings and control blocks as applicable. These do not count towards the 400 word limit.
- ❑ Abstracts **must** contain an unclassified outline including the key points of your presentation (this does not count against the 400 word count).
- ❑ Abstracts should clearly express: 1) objective, 2) relevance to the proposed topic area(s) on the following pages, 3) scope, and 4) conclusions of your presentation.
- ❑ Because of the high interest in this event, we are expecting a very large number of submissions. **Presentations that contain classified information, are clearly associated with the proposed topic area(s), and are technically focused (versus company sales pitches) will have the highest probability of selection.** Please remember that HTSC has a greater emphasis on platform and applied technology versus purely basic or foundational research which is covered at other conferences.

NOTIFICATION & PRESENTATION INFORMATION

In late April 2025, you will be contacted regarding the status of your acceptance. Final presentations will be due **30 July 2025.** Please note that selection and presentation of an abstract, whether oral or poster, does not waive registration fees. All speakers and posters will need to register and pay the applicable fees.

TOPIC AREAS

TOPIC 1: THERMAL MANAGEMENT SYSTEMS

The thermal management systems topic includes all aspects of materials, manufacturing, and design that support ballistic, air-breathing, boost-glide, defense against hypersonics, high-energy kinetic projectiles, and re-entry systems for military applications. This topic includes, but is not limited to all external structures such as aeroshells, windows, apertures, radomes, control surfaces, nosetips, and leading edges. Program and system overviews related to pertinent materials, challenges, and updates are encouraged for both expendable and reusable vehicles. Focus areas include:

- Design and ground/flight testing of thermal protection systems concept or components;
- Thermal management of subsystems including active & passive technologies;
- Novel instrumentation or applications development;
- Oxidation/ablation modeling and test;
- Erosion modeling and test, to include all environmental effects;
- Thermostructural modeling, material properties, and testing;
- Advanced structural concepts and integration;
- Weather effects;
- Manufacturing methods and the industrial base; and
- Sustainability.

TOPIC 2: PROPULSION

This topic area addresses propulsion concepts that support hypersonic flight for expendable and reusable systems. The main areas of interest include rocket and air-breathing propulsion, and responsive solutions for end game maneuverability to also include manufacturing topics that address cost and schedule. While concept development phase activities are of interest, consideration will be given to elevated Technology Readiness Levels (TRLs) and Manufacturing Readiness Levels (MRLs) where ground and flight test data from prototype propulsion components and systems are available.

Rocket Propulsion Areas of Interest Include:

- Booster motors/engines/booster systems with multiple stages demonstrated via ground testing;
- Booster motors/booster systems with multiple stages demonstrated via ground testing;
- Approaches to thrust modulation and termination;
- High performance propellants with low sensitivity;
- Launch and operating environments design consideration; and
- Divert and Attitude Control Systems (DACS).

Air-Breathing (Systems Level) Propulsion Areas of Interest Include:

- Air-breathing systems (to include scramjet, ramjet, rotating detonation engine, turbine and combined cycle) and engine development programs;
- System design solutions addressing boost, cruise, and terminal phase requirements;
- Ground test methodologies, facilities, and test diagnostics;
- Engine material, fuels, and thermal management technologies; and
- Modeling and Simulation (M&S) with validation.

ABSTRACT TEMPLATE AVAILABLE!

We recommend using our abstract template for the most accurate submission. Visit https://www.usasymposium.com/Hypersonics/cfa.php for a downloadable copy of our abstract template form.

TOPIC 3: AERODYNAMICS & AEROTHERMODYNAMICS

Aerodynamics and aerothermodynamics play a significant role in the design of hypersonic systems, both expendable and reusable, driving flight vehicle performance and robustness. These phenomena must be adequately characterized with uncertainties identified to develop guidance and control methodologies. Due to the unique challenges associated with hypersonic flight coupling of the aerodynamic and aerothermodynamic environments, advanced modeling and simulation approaches, validated by ground/flight test and evaluation are required. The HTSC Aerodynamics and Aerothermodynamics topic area addresses the challenges and ongoing investments in hypersonic system technology application and maturation. Focus areas include:

- Uncertainty modeling and quantification methods;
- Hypersonic flow field modeling and validation;
- Relevant vehicle boundary layer transition modeling, phenomenology, and test;
- Effects of flow field chemistry including plasma effects on vehicle performance;
- Effects of shock-shock and shock/boundary-layer interaction;
- Ground test methodologies and approaches (e.g., wind tunnels, shock tunnels, ballistic ranges);
- Aerodynamics influence on control surface performance;
- Ablation/erosion influence on aerodynamics coefficients;
- Jet interaction modeling and validation;
- Wake flow field and signature modeling;
- Base region flow field and aeroheating modeling; and
- Flight test validation of aerodynamic models and configurations.

TOPIC 4: NAVIGATION, GUIDANCE & CONTROL, AND ELECTRICAL SYSTEMS

Hypersonic systems offer enabling capability to counter adversarial threats and provide the U.S. with significant advantages to address both offensive and defensive requirements. However, deviations from historical aerodynamic configurations and re-entry environmental challenges require technology maturation in Navigation, Guidance & Control (NG&C) and electrical systems to support hypersonic flight systems. This topic is focused on addressing these requirements for current and future configurations of interest within the hypersonic community. Topics of interest include:

- Challenges associated with hypersonic flight systems related to NG&C and electrical systems;
- Hypersonic power system and energy storage technologies and methods (flight and ground systems);
- Auto-pilot design and implementation for hypersonic systems and platforms;
- Navigation and guidance in GPS-contested environments;
- Tactical/strategic navigation systems;
- M-Code and hypersonic-specific code and algorithm implementation;
- Unique control system technology development and maturation for moderate to high lift/drag ratio vehicles;
- Packaging of electrical systems in constrained hypersonic vehicle configurations;
- Uncertainty analysis and contributors for NG&C systems;
- Electrical failure analysis and unique electrical phenomena related to hypersonic systems;
- Electrical interactions with hypersonic environments;
- Latency mitigation methods & technologies for hypersonic systems; and
- Integration between NG&C, aerodynamic, aerothermodynamic, and power system simulation methods and analyses.

TOPIC 5: PROGRAMMATIC REVIEW

Hypersonic R&D and flight system programs are being conducted by each of the services and agencies such as the Office of the Secretary of Defense, Defense Advanced Research Projects Agency, Missile Defense Agency, and the Strategic Capabilities Office. Each organization working on hypersonics brings unique skills, capabilities, and lessons learned. Ground, air, or sea launch are examples of system differences while areas such as shape, range, size, and other key areas are vehicle unique design challenges. The program review area will focus on discussions related to current status and path forward for specific service and agency hypersonics programs including collaborative international hypersonic programs.

TOPIC 6: DEFENSE AGAINST HYPERSONICS ACROSS THE KILL CHAIN

Hypersonic threats present a unique challenge to U.S. defensive systems. They operate at high velocity, are capable of high acceleration maneuvers, operate across a large range of altitudes, and do not have a predictable trajectory. This topic area will examine the applicability of current and future defensive systems against the hypersonic threat and is devoted to generation of key knowledge points, including modeling and simulation, to mature defensive systems that may include:

- Architecture concepts studies;
- Sensor / shooter interactions;
- Battle management and CONOPS;
- Fire control and engagement management;
- Targets and threats;
- Test planning;
- All aspects of the threat kill chain (detect, track, engage, assess);
- Survivability of the defensive system;
- Determination of lethality (hard or soft kills); and
- Technical challenges of the mission.

TOPIC 7: DETECTING & TRACKING HYPERSONIC OBJECTS

This topic area will examine technologies and capabilities for detecting, countering the operation, and counter detection of hypersonic objects. There is a need to develop the capabilities to detect and defeat the adversaries' hypersonic threats in different flight scenarios. This topic area is devoted to examining possible detection techniques associated with the hypersonic dynamics and flight environment effects, as well as the possible techniques to counter such detection. Important to success in this area are development of methodologies and systems that employ an all domain approach, network-centric operation, and distributed decision making. Combined with technologies and testing associated with achieving hypersonic velocities, areas of interest include:

- Modeling, experiments, and phenomenology;
- Efficient algorithms and data fusion;
- Machine learning and autonomy;
- Interaction and scattering of multispectral beams with wave turbulence;
- Detection of hypersonic objects using specific spatial waveforms;
- Impact on navigation and guidance;
- Other topics specific to detection and countermeasure;
- Vehicle signature effects to include impact of ablation, heating, turbulence; and
- Sensor platform capability and experimental results.

TOPIC 8: SENSING & COMMUNICATION IN A HYPERSONIC ENVIRONMENT

Existing subsonic missiles have developed terminal sensors to increase accuracy and lethality for both stationary and moving targets. This topic seeks abstracts that investigate terminal, ISR, and homing sensors for offensive and defensive system. The high-speed environment adds additional difficulty due to compressed engagement timeline, high surface temperature on the sensor window, and limited aperture size. In addition, future capability requirements may drive the need for developing the ability to send and receive multiple signal types and thus require a variety of sensors and windows. Areas of interest include:

- Sensor trade studies for a hypersonic environment;
- In flight non-contact methods of diagnostics of hypersonic environment;
- High temperature antennae and window materials;
- Wave propagation using space domain and time FDTD simulations in hypersonic environment;
- Propagation of signals through high temperature materials and flow fields;
- Signal processing;
- Sensor designs for hypersonic vehicles;
- Ground test facilities for combined hypersonic environment testing related to sensing;
- Modeling and simulation of hypersonic engagements of a moving target,
- Target discrimination in a time constrained environment; and
- Communications architectures and technologies.

TOPIC 9: GROUND TEST CAMPAIGNS & FACILITIES

This topic area addresses ground test and evaluation of hypersonic weapon technologies, components, and systems to validate models and support flight system development. Areas of interest include, but are not limited to:

- Lessons learned during ground test;
- Methods of using ground testing to reduce flight test risk;
- Capabilities of existing ground test facilities;
- Ongoing and proposed facility upgrades;
- The technical challenges of future facility needs;
- Ground test results and analysis availability and access to data repositories;
- Ground test traceability to flight environments and physics;
- Hardware in the loop;
- Novel hypersonic instrumentation applicable to ground and flight test data acquisition; and
- Current ground test activities supporting hypersonic flight system development (characterization, as well as qualification testing).

TOPIC 10: SYSTEMS ENGINEERING

Systems Engineering involves developing and executing multidisciplinary solutions to enable emerging hypersonic platform capabilities, as well as vehicle level integration of subsystems into hypersonic platforms across all mission phases and life cycle. This topic area will also cover multidisciplinary design methods to optimize system performance in a highly constrained environment. Specific focus will include, but is not limited to:

- Integration of subsystems (flight electronics, ordnance, controls, etc.);
- Performance trades with competing weight, range, payload parameters;
- Integration, test, and assembly, as well as launch system integration;
- System architectures and design to provide operational capabilities;
- Booster-to-vehicle integration;
- Model based system engineering;
- Affordability & producibility;
- Reliability & maintainability;
- Mission, campaign, and wargaming simulations;
- Digital engineering applicable to hypersonic systems; and
- Applicable systems engineering lessons learned.

TOPIC 11: FLIGHT EXPERIMENTATION & TESTING

Hypersonic flight experiments and tests have been conducted for several years in the U.S. and with our international partners, the results of which have brought a wealth of data about the characteristics of hypersonic flight. This topic area is dedicated to plans, objectives, results, challenges, lessons learned, and other items related to hypersonic flight testing. It explores new ways to conduct flight tests in a resource and schedule constrained environment. Topics such as accuracy, maneuvers, thermal protection capabilities, all weather operations, range infrastructure, post flight recovery, flight termination, diagnostics, measurements, communications, SWIL/HWIL, Monte Carlo simulations, security, and capabilities will also be addressed. The ultimate goal is to share knowledge, plans and results of hypersonic flight experimentation and testing and determine where knowledge and efforts can be leveraged such as flight test data repositories.

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TOPIC 12: MISSION PLANNING & C4ISR (OFFENSE & DEFENSE)

The ability to employ hypersonic systems (offensive and defensive) in compressed timelines is of extreme importance to the DoD. This session will examine various capabilities and the technologies related to: resource management, ISR-T, targeting, command and control, C2BMC, and communication and decision making as it applies to employing hypersonic capabilities. Areas of interest include:

- Compressing the kill chain to reduce our adversaries' decision time;
- Energy management and trajectory optimization with vehicle constraints;
- ISR-T, targeting and identification, and cueing/custody;
- Application of artificial intelligence capabilities;
- Mission (offensive and defensive) and flight planning;
- Decision making;
- Target assignment;
- Development of weapons quality data; and
- Defensive and survivability constraints.

TOPIC 13: WEAPONS EFFECTS & LETHALITY

The hypersonic environment presents unique challenges in weapon effects and system lethality assessments against various target types including structural, and air, land, and sea vehicles. This topic is seeking abstracts on weapon effects and lethality related to hypersonic offensive and defensive systems. Areas of interest include:

- Modeling and simulation of weapon effects;
- Modeling and simulation of lethality;
- Lethality data integration into weaponeering tools;
- Minimizing collateral damage;
- Kill assessment methodologies;
- Ground and flight testing;
- Campaign employment and target-weapon pairing;
- Advanced technologies in hard-kill and soft-kill;
- Fuzing, energetic materials, and lethality enhancements;
- Post-intercept debris and damage state characterization;
- Implications on shot doctrine; and
- Communication between platforms to optimize lethality.

TOPIC 14: MODELING & SIMULATION, ANALYSIS, AND DESIGN

The Modeling & Simulation, Analysis, and Design topic includes all aspects of the design and sustainment life cycle for air-vehicles, weapon systems, and warhead solutions engaging in hypersonic flight and deployment. Being able to accurately capture the complex physical interactions in a dynamic environment associated with this flight regime is critical to ensuring both strategic and operational advantage in today's fast-paced S&T arena. In addition, advancing multidisciplinary trade study methods to optimize system performance in a highly constrained environment is also of critical importance. Specific focus areas for this topic will include, but are not limited to:

- Existing high-fidelity and weaponeering modeling and simulation solutions;
- Technologies for analyzing/visualizing large data sets;
- Minimizing program costs and schedule utilizing modeling and simulation;
- MS&A to provide insights into operational effectiveness;
- Design optimization trade studies;
- Toolset advancements to account for extreme environments;
- Non-deterministic MS&A approaches;
- Uncertainty quantification techniques;
- MS&A validation against ground and/or flight test data;
- Efficient computer processing architectures (HPC, clusters) and unique verification and validation challenges; and
- Implementation and execution within a digital engineering ecosystem/environment.