

**26 – 29 AUGUST 2019
SPRINGFIELD, VA**

CALL FOR ABSTRACTS

Abstract Due Date: 1 April 2019

HTSC

**HYPERSONIC TECHNOLOGY
& SYSTEMS CONFERENCE**

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1 April 2019

Please Join Us!

We invite you to participate in the second annual Hypersonic Technology & Systems Conference (HTSC) which will take place at the National Geospatial Intelligence Agency (NGA) Campus East (NCE) Conference Center in Springfield, VA, 26 – 29 August 2019.

Sustained hypersonic flight within dense 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 such systems is also of increased interest. The technologies required to enable the reliable use of hypersonic vehicles are multi-disciplinary. Some of these technologies that HTSC focuses on include:

- Aerodynamics
- Aerothermodynamics
- Detection and tracking
- Navigation, guidance and control
- Propulsion challenges (air-breathing & rocket boost)
- Sensors
- Power systems
- Materials
- Structures
- Platform integration
- Mission planning/C4ISR

This conference will bring together the best and brightest involved in the development of hypersonic technologies in a unique, limited-attendance forum which will facilitate knowledge sharing and collaboration opportunities. This conference will highlight the nation's investments in systems integrated hypersonic technologies for both research and development and weapon platform integration for offense and defense. This event will be held at a restricted-access level . Attendance is limited to U.S. citizens with a final SECRET clearance.

HTSC receives technical guidance from the following organizations:

Air Force Research Laboratory
Army Aviation and Missile Research Development and Engineering Center
Army Space & Missile Defense Command/Army Forces Strategic Command
Arnold Engineering Development Complex
The Boeing Company
Georgia Tech Research Institute
Integration Innovation, Inc.
Johns Hopkins University Applied Physics Laboratory
Lockheed Martin Corporation
Missile Defense Agency
Naval Surface Warfare Center
Northrop Grumman Corporation
Office of Naval Research
Office of the Under Secretary of Defense for Research and Engineering
Office of the Under Secretary of Defense for Acquisition and Sustainment
Raytheon Missile Systems

KEY DATES TO REMEMBER

1 April 2019 – Abstract Due Date
Early May 2019 – Abstract Authors Will Be Notified of Results
26 July 2019 – Final Presentations Due
26 - 29 August 2019 – Conference

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TOPIC AREAS

TOPIC 1: THERMAL PROTECTION & MANAGEMENT SYSTEMS

This topic area includes all aspects of thermal protection systems (TPS) design to include active and passive approaches, analysis, and manufacturing that support ballistic, airbreathing, boost-glide, defense against hypersonics, high-energy kinetic projectiles, and re-entry systems for military applications. Program and system overviews with pertinent materials, issues, and updates related to current programs are also included. Focus areas include:

- Design and ground/flight testing of thermal protection systems concept or components;
- Thermal management of subsystems including active & passive technologies;
- Embedded sensor and antenna window technologies;
- Novel Instrumentation or applications to support TPS development;
- Emerging and innovative materials for TPS applications;
- Oxidation/ablation modeling and test;
- Erosion modeling and test;
- Thermostructural modeling, material properties, and testing;
- Advanced and additive manufacturing methods of TPS elements; and
- Nosetips and leading edges.

TOPIC 2: PROPULSION

This topic area addresses propulsion concepts that support hypersonic flight and responsive strike systems. Three main areas of interest include solid rocket motors, air-breathing propulsion, and small solid stage motors with responsive solutions for end game maneuverability. While concept development phase activities are of interest, consideration will be given to elevated TRLs/MRLs where ground and flight test data from prototype propulsion components and systems are available.

Rocket Motor Areas of Interest Include:

- Booster motors/booster systems with multiple stages demonstrated via ground testing;
- Nozzle and thrust vectoring systems;
- Approaches to thrust modulation and termination;
- High performance solid propellants with low sensitivity;
- Air launch design technologies;
- Divert and Attitude Control Systems (DACs);

Air-Breathing Propulsion Areas of Interest Include:

- Scramjet system and engine development programs;
- System design solutions addressing boost, cruise, and terminal phase requirements;
- Ground test methodologies, facilities, and test diagnostics;
- Engine material technologies; and
- Flow path M&S with validation.

TOPIC 3: AERODYNAMICS & AEROTHERMODYNAMICS

Aerodynamics and aerothermodynamics play a significant role in the design of hypersonic systems, 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 on-going investments in hypersonic system technology 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 on vehicle performance;

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- Effects of shock-shock and shock/boundary-layer interaction;
- Ground test methodologies and approaches (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 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;
- 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, and the Strategic Capabilities Office. Each organization working on hypersonics brings unique skills and capabilities. 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.

TOPIC 6: DEFENSE AGAINST HYPERSONIC SYSTEMS

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. The Defensive Systems topic area is devoted to generation of key knowledge points, including modeling and simulation, to mature a defensive systems that may include:

- Architecture concepts studies;
- Sensor / shooter interactions;
- Battle management and CONOPS;
- 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. For example, analysis and characterization of target, as well as clutter produced due to the presence of different types of density irregularities inside the flow around a hypersonic vehicle could provide valuable insights for new efficient detection and countering capabilities. Combined with technologies and testing associated with achieving hypersonic velocities, areas of interest include:

- Modeling, experiments, and phenomenology;
- 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;
- Target signature effects to include impact of ablation, heating, turbulence; and
- Sensor platform capability and experimental results.

TOPIC 8: SENSING 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 and ISR sensors for a hypersonic system. The high-speed environment adds additional difficulty due to compressed engagement time line, 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;
- High temperature antennae and window materials;
- Propagation of signals through high temperature materials and flow fields;
- 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; and
- Target discrimination in a time constrained environment.

TOPIC 9: GROUND TEST FACILITIES AND INSTRUMENTATION

This topic area addresses ground test and evaluation of hypersonic weapon technologies, components, and systems to validate models and support flight system development. Abstracts are being sought from DOD, DOE, NASA, and private industry that are developing and utilizing Government-owned or commercial ground test facilities to address and mature hypersonic technologies for weapon systems. Areas of interest include, but are not limited to:

- 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;
- 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).

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TOPIC 10: SYSTEMS ENGINEERING AND SYSTEMS DESIGN

Systems engineering and systems design 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 trade study methods to optimize system performance in a highly constrained environment. Specific focus will include, but is not limited to:

- Integration of systems components (flight electronics, ordnance, controls);
- Integration of sensors/windows into heatshields and outer mold lines (OMLs);
- Performance trades with competing weight, range, payload parameters;
- Launch system integration;
- Booster-to-vehicle integration;
- Fluid thermal structural interaction;
- Model based system engineering;
- Affordability & producibility; and
- Reliability & maintainability.

TOPIC 11: FLIGHT TESTING

Hypersonic flight tests have been conducted for several years, the results of which have brought a wealth of data about the characteristics of hypersonic flight. DARPA, DOE, NASA and the defense services have demonstrated various key technological areas using sled tests and wind tunnel tests and have conducted full system flight tests. This topic area is dedicated to plans, objectives, results, challenges and other items related to hypersonic flight testing. Explore new ways to do flight tests in a resource and schedule constrained environments. Topics such as accuracy, maneuvers, thermal protection capabilities, range infrastructure, flight termination, diagnostics, measurements, communications, security and capabilities will also be addressed. The ultimate goal is to share knowledge and plans of hypersonic flight testing and determine where knowledge and efforts can be leveraged.

TOPIC 12: MISSION PLANNING & C4ISR

The ability to employ hypersonic systems (offense and defensive) on time-sensitive and critical targets is of extreme importance to the DoD. This session will examine various capabilities and the technologies related to: testing, ISR, targeting, command and control, 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, target and identification;
- Mission and flight planning;
- Decision making;
- Development of weapons quality data; and
- Defensive and survivability constraints and endgame lethality.

JOIN OUR SPONSORSHIP TEAM

This event is made possible in large part, by industry and academia sponsorships. We hope you will consider joining the sponsorship team. Top 5 reasons to become an HTSC Sponsor:

1. Play a key role in helping the U.S. keep their defense and offense state of the art
2. Let the U.S. hypersonic industry know how you can and do contribute
3. Get in front of your target market
4. New clients, new customers, new business
5. Brand recognition as a key player in the arena

A variety of sponsorship packages are available for all budgets. For more information, contact Erin Foster at 937-689-7387 or efoster@blue52productions.com or visit <https://www.usasymposium.com/Hypersonics/2019/sponsorship.php>.

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ABSTRACT SUBMISSION

We look forward to receiving your abstract(s) for the 2019 Hypersonic Technology & Systems Conference.

This event is restricted and conducted at the SECRET//NOFORN level. Attendance is limited to U.S. citizens with a final SECRET clearance. Final presentations should not be more restrictive than Distribution C.

ABSTRACT & SUBMISSION REQUIREMENTS

- **Abstracts must be unclassified.**
- Abstracts should 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
- Abstract submissions more restrictive than Distribution A should be password protected with passwords being sent to Sherry Johnson at sjohnson@blue52productions.com. More detailed instructions for password protecting and submitting your abstracts can be found on the submission page on-line.
- Because of the high interest in this event, we are expecting a very large number of submissions for the 2019 HTSC. Presentations that have content beyond the unclassified level, 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.
- Abstracts should be relevant to one or more of the topics described on the previous pages.
- Abstracts should be no more than 400 words long.
- Abstracts must contain an unclassified outline containing the key points of your presentation (this does not count against the 400 word count).
- Abstracts should include the title of your abstract in the body of the submission (this does not count against the 400 word count).
- Abstracts should clearly express: 1) objective, 2) relevance to the proposed topic area(s), 3) scope, and 4) conclusions of your presentation.
- If appropriate, be sure to have your derivative classifier do a sanity check on your unclassified abstract prior to submitting it.
- If you find it impossible to submit a worthwhile abstract at the unclassified level, please call Michelle Williams at 937-554-4632 for potential alternative options.
- **IMPORTANT:** Speed up your organizational release process of your abstract by letting your approvers know that abstracts will not be published on the web or in proceedings, nor will they be distributed beyond the technical selection committee.

NOTIFICATION & PRESENTATION INFORMATION

In early May 2019, you will be contacted regarding the status of your acceptance. Final presentations will be due 26 July 2019. Please note that selection and presentation of an abstract, whether oral or poster, does not waive any applicable registration fees.

TO SUBMIT YOUR ABSTRACT, VISIT

<https://www.usasymposium.com/Hypersonics/2019/cfaForm.php>