



HTSC

HYPERSONIC TECHNOLOGY
& SYSTEMS CONFERENCE

CALL FOR ABSTRACTS

27 - 30 AUGUST 2018

REDONDO BEACH, CA

**ABSTRACTS & OUTLINES
DUE: 2 APRIL 2018**

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**HYPERSONIC TECHNOLOGY
& SYSTEMS CONFERENCE**

PLEASE JOIN US!

We invite you to participate in the first annual Hypersonic Technology & Systems Conference (HTSC) which will take place at the Aerospace Presentation Center in Redondo Beach, CA 27 - 30 August 2018.

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. These include aerodynamics, aerothermodynamics, navigation, guidance and control, in addition to challenges of air-breathing propulsion, rocket boost, and launch platform integration. This conference will bring together the best and brightest involved in the development of hypersonic technologies in a forum which will facilitate knowledge sharing and collaboration opportunities. This conference will highlight the nation's investments in hypersonic technologies for both research & development and weapon platform integration. This event will be held at the SECRET//NOFORN 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
Integration Innovation, Inc.
Johns Hopkins University Applied Physics Laboratory
Naval Surface Warfare Center
Office of the Assistant Secretary of Defense for Research and Engineering
Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics
Missile Defense Agency
Northrop Grumman Corporation (Venue Host)
Raytheon Missile Systems

KEY DATES TO REMEMBER

- **2 APRIL 2018** – Abstract Due Date
- **EARLY MAY 2018** – Abstract Authors Will Be Notified
- **27 JULY 2018** – Final Presentations Due
- **27 - 30 AUGUST 2018** – Conference

TO SUBMIT YOUR ABSTRACT, VISIT [HTTPS://WWW.USASYMPOSIUM.COM/HYPERSONICS/2018/CFA.PHP](https://www.usasymposium.com/hypersonics/2018/cfa.php)

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TECHNICAL TOPICS

TOPIC 1: AERODYNAMICS AND AEROTHERMODYNAMICS

Aerodynamics and aerothermodynamics play a significant role in the design of hypersonic missile systems, driving flight vehicle performance and durability. These phenomena must be adequately characterized and uncertainties identified to develop guidance and control methodologies. Due to the unique challenges associated with hypersonic flight, significant investment must be directed to developing aerodynamic models through the use of computational fluid dynamics and ground test and evaluation. The HTSC Aerodynamics and Aerothermodynamics topic area is devoted to discussions addressing the challenges and on-going investments in hypersonic system technology maturation.

Focus areas include:

- Hypersonic challenges for aerodynamic and aerothermodynamic modeling;
- Aerodynamic uncertainties;
- Hypersonic flow field modeling methodologies;
- Hypersonic flow field gridding methodologies;
- Boundary Layer Transition influence on aerodynamic control and aeroheating and analytic methodologies;
- Flow field chemistry models and validation;
- Ground test and evaluation (wind tunnels, shock tunnels, ballistic ranges);
- Effects of atmospheric uncertainty;
- Aerodynamic control methodologies;
- Vehicle geometric changes and influence on aerodynamics;
- Aerothermodynamic effects and interaction with vehicle flight behavior;
- Current and future vehicle configurations and aerodynamic modeling;
- Wake flow field modeling;
- Base region flow field modeling; and
- Flight test validation of aerodynamic models and configurations.

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TOPIC 2: DEFENSE SYSTEMS

Hypersonic threats present a unique challenge to U.S. defense systems. Hypersonic threats 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 defense systems against the hypersonic threat. The Defense Systems topic area is devoted to discussions addressing modeling and simulation of defense systems against hypersonic threats, all aspects of the threat kill chain, survivability of the defense system through the flight regime, and determination of lethality (hard or soft kills).

TOPIC 3: DETECTING & COUNTERING HYPERSONIC OBJECTS

This topic area will examine radio frequency (RF) 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 RF 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 RF phenomenology;
- Interaction, and scattering of RF and laser beams with wave turbulence;
- Detection of hypersonic objects using specific spatial waveforms;
- Impact on navigation and guidance;
- Other topics specific to detection and countermeasure; and
- Other topics outside of RF technology.

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TOPIC 4: 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, and other items related to hypersonic flight testing. Topics such as accuracy, maneuvers, thermal protection capabilities, range infrastructure, diagnostics, measurements, communications 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 5: 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;
- Instrumentation used for data acquisition; and
- Current ground test activities supporting hypersonic flight system development (characterization as well as qualification testing).

Hypersonic weapon system components of interest include thermal protection systems, propulsion systems, ordnance technologies, seekers and associated components, airframe structures, as well as aerodynamic control systems. Specific system ground test areas of interest include aerodynamics, shock and vibration, aerothermodynamics, ablation, boundary layer transition, thermostructural characterization, weather encounter, lethality assessment, propulsion testing (including air-breathing), and flight electronics.

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TOPIC 6: PROGRAMMATIC REVIEW

Hypersonic weapon R&D programs are being conducted by each of the services and agencies such as Office of the Secretary of Defense, Defense Advanced Research Projects Agency, and the Strategic Capabilities Office. Each organization working on hypersonic weapons programs brings some unique capabilities. Differences such as being ground launched or air launched are fundamental differences, but areas such as hypersonic vehicle shapes, ranges, sizes, and other key areas are different as well. This topic area will focus on discussions related to service and agency hypersonic weapon R&D programs with the focus on current path and plans for the future and ultimate goals of each program.

TOPIC 7: PROPULSION

This topic area addresses propulsion concepts that support single-use 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.

Solid Rocket Motors Areas of Interest:

- Booster motors/booster systems with multiple stages demonstrated via ground testing;
- Nozzle vectoring systems;
- Motor case designs and materials;
- Approaches to thrust modulation and termination;
- High performance solid propellants with low sensitivity;
- Performance prediction methodologies; and
- Depressed trajectory design methods.

Air-Breathing Propulsion Areas of Interest:

- Scramjet engine development programs;
- System design solutions addressing boost, cruise, and terminal phase requirements;
- Igniter technology;
- Integration of weapon components (flight electronics, ordnance, controls);
- Ground test methodologies, facilities, and test diagnostics;
- Engine material technologies; and
- Flow path M&S with validation.

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Small Stage Solid Rocket Motor Areas of Interest:

- High performance solid propellants with low sensitivity;
- Non-eroding nozzle throat materials;
- Motor case materials;
- High altitude ignition systems;
- Divert and Attitude Control Systems (DACs);
- Attitude Control Systems (ACS); and
- DACs/ACS performance prediction methodologies.

Other Miscellaneous Areas of Interest:

- Ground testing facilities and capabilities to include altitude simulation;
- Flight termination systems for solid rocket motors; and
- Trade studies on booster system options and performance predictions for enabling hypersonic flight.

TOPIC 8: SENSING IN A HYPERSONIC ENVIRONMENT

Existing sub-sonic missiles have developed terminal sensors to increase accuracy and lethality for both stationary and moving targets. This topic seeks abstracts that investigate terminal sensors for a hypersonic missile. The high speed environment adds additional difficulty in the areas of reduced terminal 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:

- Terminal sensor trade studies for a hypersonic environment;
- High temperature antennae and window materials;
- High temperature material RF propagation;
- Terminal sensor designs for a hypersonic missile;
- Modeling and simulation of hypersonic engagements of a moving target; and
- Target discrimination in a time constrained environment.

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TOPIC 9: THERMAL MANAGEMENT CONTROL (ACTIVE & PASSIVE)

This topic area includes all aspects of thermal protection systems (TPS) design, analysis, and manufacturing that support ballistic, airbreathing, boost-glide, defense against hypersonics, high-energy kinetic projectiles, and re-entry systems for military applications.

Topics may include high-temperature materials and associated material properties, insulation materials and concepts, TPS and material modeling and simulation, TPS system concepts and design, electromagnetic windows, ablation, erosion, and manufacturing of TPS systems. Program and system overviews with pertinent materials, issues, and updates related to current missile programs are also included.

Focus areas include:

- Development or ground/flight testing of missile thermal protection systems concept or components;
- Embedded sensor and antenna 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 10: VEHICLE ELECTRICAL SYSTEMS, SOFTWARE, AND NAVIGATION GUIDANCE & CONTROL

Hypersonic missile 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 the historical aerodynamic configurations of re-entry systems require technology maturation in Navigation, Guidance & Control (NG&C) and electrical systems to support hypersonic flight systems. This topic is focused on addressing NG&C requirements for current and future configurations of interest within DOD. Discussions are encouraged in the following areas:

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- Challenges associated with hypersonic flight systems related to NG&C and electrical systems;
- Navigation and guidance in GPS-denied environments;
- Anti-jamming/spoofing technology;
- Tactical/Strategic navigation systems;
- M-Code development;
- 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;
- Power system technologies and methods (flight and ground systems);
- System latency mitigation methods & technologies;
- Ground test and evaluation methods and scene generators (facilities, techniques);
- Integration between NG&C and aerodynamic modeling; and
- System simulation methods and Monte Carlo Analysis.

Additional interest exists in flight test and evaluation of hypersonic systems and resulting modeling and simulation validation for NG&C components and methods. Specifically, challenges, lessons learned, future requirements, and description of additional development and validation planned during future technology maturation.

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ABSTRACT SUBMISSION

We look forward to receiving your abstract(s) for the 2018 HTSC. 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 may carry a distribution level of A or C.
 - A = Approved for public release, distribution unlimited
 - C = U.S. Government Agencies and their contractors only
- Submissions more restrictive than Distribution A should be password protected with passwords being sent separately to Sherry Johnson at sjohnson@blue52productions.com. More detailed instructions for password protecting and submitting your abstracts can be found on the submission page online.
- 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 limit).
- Abstracts should include the title of your abstract in the body of the submission (this does not count against the 400 word limit).
- Abstracts should clearly express: 1) objective, 2) relevance to the proposed topic area(s), 3) scope, and 4) conclusions of your presentation.
- **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.*

We are expecting a high number of submissions. Presentations that will have content (oral or written) beyond the unclassified level, and are most closely associated with the proposed topic area(s) and conference description will have the highest probability of selection. Abstracts that do not support the technical topics, or do not provide technical (vs marketing/sales) content, may not be accepted.

NOTIFICATION & PRESENTATION INFORMATION

In early May 2018, you will be contacted regarding the status of your acceptance. Final presentations will be due 27 July 2018. Please note that selection and presentation of an abstract, whether oral or poster, does not waive any applicable registration fees. For questions, please contact Ms. Michelle Williams, mkw@blue52productions.com, 937-554-4632.

GOVERNMENT TRAVEL APPROVAL

Some government organizations still require up to six months for travel approval. Start the process now!