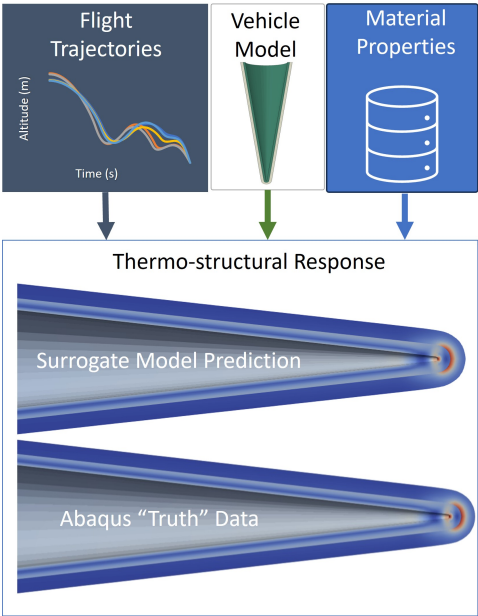


WHO

SYSCOM: SSP
Sponsoring Program: Navy SSP
Transition Target:
TPOC: SSP.SBIR@ssp.navy.mil

Other Transition Opportunities: high speed flight systems, high temperature material applications

Notes: CFD Research Corporation (CFDRC) is a leader in developing and delivering innovative and breakthrough aerospace and defense technologies to DoD, NASA and private industry customers. The primary product of the proposed effort is an upgraded hypersonic vehicle performance M&S framework, capable of evaluating survivability of TPS designs for hypersonic applications using structural performance surrogate models.



WHAT

Operational Need and Improvement: Variability in the manufacturing processes of thermal protection (TPS) materials negatively affects flight vehicle performance and reduces life cycles. While material properties and architectures of TPS are well known, performance evaluation relies on the “build and see” approach that slows material development and qualification.

Specifications Required: Required specifications include flight vehicle geometries, material properties, and flight trajectories.

Technology Developed: The technology developed will be a tool or framework for generating data, training, and deploying a thermo-structural response surrogate for hypersonic flight response modeling. The thermo-structural surrogate will provide added capability for the prediction of the probability of material mechanical failure as a function of the current aerothermal state of the solution.

Warfighter Value: The M&S tool provides capabilities to quickly evaluate variations in TPS material quality and processing of hypersonic flight vehicles flying real trajectories. The primary use case would be in the materials and processes selection, control, and implementation plans for flight systems requiring TPS.

WHEN

Contract Number: N64267-24-C-0003 **Ending on:** Apr 17, 2025

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Customer Kickoff	N/A			1st QTR FY24
Model data generation	Low			3rd QTR FY24
Initial Surrogate Trained	Medium	Verified against test data	3	3rd QTR FY24
Thermal Response Verification	Low	cross-verification between models	4	3rd QTR FY24
Thermo-structural Verification	Low	cross-verification between models	4	4th QTR FY24
V2 Surrogate Trained	Medium	cross-verification between models	3	1st QTR FY25
Final Software Framework	Low	demonstrable execution and verification testing	4	3rd QTR FY25

HOW

Projected Business Model: Revenue for the product development, marketing, sales, and support will stem from three sources: 1) R&D contracts, 2) Software licensing, and 3) Consulting projects and services. Initially, it is expected that the revenue stream would comprise of R&D projects with selected customers to further develop and improve the initial capability and adapt and apply the framework to specific systems. The second revenue stream would result from spinning out or licensing the technology, potentially in a joint venture, to transition the technology to early adopters/customers with proper security and export control considerations. The final revenue stream would result from providing consulting services to DoD elements and prime contractors using the software tools and expertise developed under the SBIR project.

Company Objectives: CFDRC is focused on commercializing advanced technologies; this includes transitioning technologies to government agencies and Primes as well as through products, spin-offs and out-licensing. One CFDRC commercialization strategy is the “insertion” of technologies into DoD, NASA, and other national programs (e.g. by leveraging Beyond Phase II efforts). Dr. Patton has recently transitioned the HEAT/ATAC2 software into multiple DoD labs and customers within both the Army and Navy. This has led to continued development and support of the software to meet customer needs. Another commercialization strategy is to provide expert support services to US Government and industry for adaptations and applications of new technologies.

Potential Commercial Applications: The anticipated benefit of this project includes a framework for fast material and TPS performance modeling over entire hypersonic flight trajectories that will be integrated with tools for determining bulk property information based on constituent components, material design, and processing methods. The individual software components, such as ATAC2, have wide application to multiple DoD hypersonic programs for Army, Navy, Air Force, and the Missile Defense Agency. Potential commercial applications of this framework include aiding in design decision making of TPS based on system performance requirements.

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