

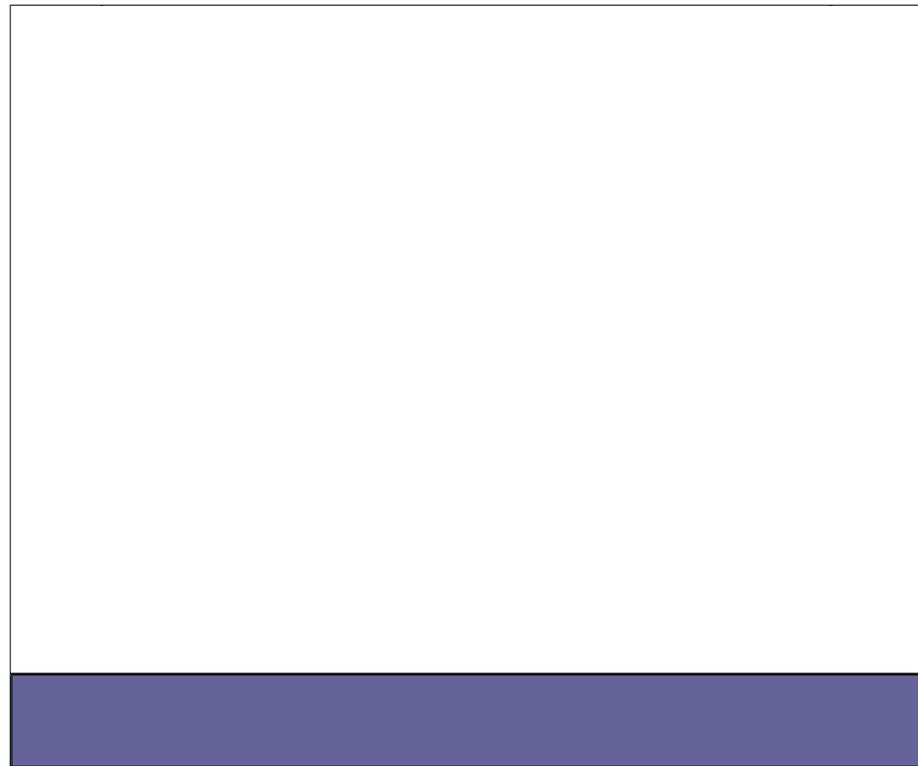


Air Force Research Laboratory | AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

HYTECH PROGRAM ONE STEP CLOSER TO INTEGRATION OF SCRAMJET PROPULSION



Researchers from the Propulsion Directorate and their commercial partners crossed yet another bridge in the development of a hydrocarbon-fueled, supersonic combustion ramjet (scramjet) engine. This type of propulsion will allow longer range and dramatically decreased reaction time for weapons used against high-value targets at long standoff ranges.



Air Force Research Laboratory
Wright-Patterson AFB OH

Accomplishment

The directorate successfully completed the first-ever hydrocarbon fuel-cooled combustion initiator (pilot) demonstration under its Hypersonic Technology (HyTech) program. Engineers from United Technologies Research Center, a subsidiary of Pratt & Whitney of West Palm Beach, Florida, integrated a hydrocarbon fuel-cooled, flight-like pilot system into the United States Air Force-owned scramjet combustor.

Although developed for one-time use, the scramjet operated through seven combustion cycles. The tests met all the thermal design requirements and test objectives. Specifically, the engine never exceeded material temperature and structural limits. Posttest results suggest that no fuel coking occurred during the tests, another positive sign for scramjet operability.

Background

The HyTech program is the latest in a long series of Air Force efforts to prove the viability and utility of the supersonic combustion ramjet engine. Current plans call for the directorate to fly the hydrocarbon scramjet engine technology on the X-43C demonstrator vehicle.

The X-43C program is a joint National Aeronautics and Space Administration and Air Force program that will fly the HySET engine on a flight test vehicle similar to and larger than the Hyper-X vehicle (X-43A). Directorate engineers continue to investigate high-speed propulsion technologies with widespread applicability.

By maturing scramjet propulsion, researchers will also provide a key component to a new breed of propulsion known as the combined cycle engine. These engines, made from some combination of turbine, ramjet, scramjet, and rocket engines, use each of the different cycles to the fullest advantage of their respective efficiencies. Such combined-cycle engines will enable a family of vehicles, which includes global range, high-speed aircraft and "spaceplane"-type vehicles with cost-effective, on-demand access to space for future systems.

Propulsion
Emerging Technologies

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (02-PR-06)