NASA awards UT Arlington grant to study hypersonic propulsion

Rob Robertson
Reporter

Two University of Texas at Arlington aerospace engineering professors have been awarded a three-year, $640,000 NASA National Research Award to study engine performance at hypersonic speeds – work aimed at reducing air travel times and making space access affordable.

Luca Maddalena and Luca Massa, both assistant professors in the Department of Mechanical and Aerospace Engineering, are the only collegiate researchers in the country to garner the NASA hypersonic award.

“We’re honored to be the only U.S. grant winners to study this very important topic,” Maddalena said in a release. “This study on the effectiveness of new fuel injection schemes might lead to enabling affordable access to space for large hypersonic vehicles.”

Hypersonic speed is that which reaches Mach 5, or 3,500 miles per hour and above. Hypersonic technology differs from rocket technology in that hypersonic engines pull oxygen from the surrounding air. Rocket propulsion engines carry their oxygen source on board, which limits the payload of what the aircraft can carry.

With the speed of a commercial airliner between 500 and 600 mph, hypersonic aircraft could cut the flight time of a trans-Pacific flight by six to eight hours.

Maddalena and Massa said the challenge in achieving hypersonic speed is that the fuel and oxygen, at the typical speed inside a supersonic engine don’t have sufficient time to effectively mix and ignite.

The professors say the key to achieving ignition and combustion at supersonic speed is a proper design of the injectors. They are investigating new configurations in collaboration with NASA’s Hypersonic Airbreathing Propulsion Branch at Langley Research Center in Virginia.

UT Arlington’s Aerodynamics Research Center offered the team a place to conduct research on hypersonic speeds. The ARC is marking its 25th anniversary and is the heart of aerodynamics.
research in North Texas.

The NASA grant will fund the doctoral studies of Fabrizio Vergine and Matthew Crisanti, whose technical contribution and dedication on this project has been essential, Maddalena and Massa said.

“They continue to inspire new generations of North Texas students to undertake a career in aerodynamic research and space exploration,” Massa said.

The research team already has made a trip to Langley Research Center, where NASA engineers have expressed interest in conducting future hypersonic speed tests.

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