



# Technology Opportunity

## Liquid Propellant Tracing Impingement Injector for Use with Rocket Thrusters and Advanced Engine Systems

Innovators at NASA's Marshall Space Flight Center have patented a liquid propellant injector for use with rocket thrusters and other advanced engine systems. The injector's unique design introduces the fuel and oxidizer into the combustion chamber at different ports, keeping low temperature fluids on the chamber wall and hot gas at the center core. The injector can be tailored for desired liquid propellants, flow rates, and tangential momentum by varying the diameters and angles of the injector openings. Conventional injectors introduce propellants axially, requiring a long combustion chamber to ensure that propellants mix and combust completely before exiting the nozzle. In contrast, Marshall's design reduces combustion chamber length, complexity, manufacturing costs, and the overall weight of the engine system.

### Benefits

- **Lightweight:** Shortens the required chamber length, reducing the amount of material needed and the overall weight of the system
- **Cost-effective:** Eliminates the need for welding or brazing during the fabrication process, and enables fabrication in just two steps—initial buildup and final machining—reducing expense and producing a single, compact injector
- **Robust:** Increases the injector life cycle through a unique self-cooling mechanism that keeps hot gas at the chamber core and cooler temperatures at the chamber walls

### Commercial Applications

- Rocket thrusters
- Advanced engine systems
- Systems that require complete mixing of two fluids of similar viscosities, with one fluid encapsulating the other prior to mixing, such as industrial two-part paint spray and various coating systems

### Licensing and Partnering Opportunities

This technology is part of NASA's technology transfer program. The program seeks to stimulate development of commercial uses of NASA-developed technologies. NASA is flexible in its agreements, and opportunities exist for licensing and joint development. MSFC is interested in a partnership to commercialize the technology.

### Patents

U.S. Patent Number: 6,860,099

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