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Optimization of an Osculating Internal Waverider Intake with Parallel Streamlines

OIWPS inlet design method optimizes hypersonic air-breathing vehicle intakes for self-starting, efficient shock management.

Air-breathing hypersonic systems are particularly sensitive to the inflow state of air and the shock structure generated from the inlet surface. Researchers at Purdue University have developed OIWPS, a stream-tracing method for designing inlet geometries to address these problems. OIWPS uses the desired post-shock and free stream Mach numbers to optimize the upper forebody and lower cowl of the inlet. The resulting inlets are shape-transitioned, inward-turning, mixed contraction, and self-startable. This technology's primary application is in the development of the next generation of hypersonic vehicles for civilian and military use.

Advantages

- Optimized inlet design

- Shape transitioned, inward turning for minimized flow spill

- Self-startable inlets

Applications

- Inlets/intakes for combustion engines

- Air-breathing hypersonic vehicles

- Aerospace Engineering

Technology Validation:

This technology has been validated via both computational fluid dynamics (CFD) models as well as through fabrication and testing in the Boeing-AFOSR Mach 6 Quiet Wind Tunnel at Purdue University.

TRL: 6

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