



Counter-Rotating Expanding Turbomachine Rows

Counter-rotating turbine rows ingest fluctuating inflows from subsonic to supersonic, improving RDE efficiency while eliminating stators.

Fluctuating turbine inflow velocities will be common as innovative combustors, such as pressure gain combustors, gain adoption. Researchers at Purdue University have developed a turbine stage capable of ingesting fluctuating inflows, coasting from subsonic to transonic and into supersonic conditions in cycles of fractions of milliseconds. The Purdue developed turbine offers a solution for improving the efficiency of rotating detonation engines (RDEs), coupling the combustor directly to the turbine without any diffusive and accelerating passage. Additionally, Purdue's approach eliminates the need for a stator row, further contributing to volume and weight reductions. This technology offers benefits to gas turbine manufacturers who are looking to integrate rotating detonation into new or existing turbine architectures.

Advantages

- Can ingest fluctuating airflow velocities
- Improved efficiency
- Can be integrated into existing turbine architectures
- Stator-less

Applications

- Coupling with rotating detonation engines (RDEs)
- Power generation systems
- Propulsion systems

Technology Validation:

This technology has been validated through high fidelity simulations.

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Category

Aerospace & National
Security/Hypersonics &
Propulsion Systems
Energy & Power Systems/Power
Generation

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