Assistant Professorship of Sustainable Future Mobility
TUM School of Engineering and Design
Technical University of Munich

Characterization of an Air Injection System for the Investigation of the Growl/Rumble Phenomenon in a Sequential Aero Engine Combustor (RQL)

Type: Semester Thesis/Master's Thesis
Content: experimental
Possible start: February 2024

Job Description

The "Flightpath 2050" report documents Europe's vision for aviation to achieve a drastic reduction in pollutant emissions of NO_x. Rich-Quench-Lean combustors (RQL) are a chamber design which produces lower NO_x emissions and are currently in use with kerosene. Such a low emission chamber designs are prone to combustion instabilities as the Growl/Rumble phenomenon. The Growl/Rumble phenomenon describes a low frequency noise which may damage the engines. Entropy and equivalence ratio waves are suspected as possible causes for this phenomenon.

This student thesis is the first step towards the investigation of the Growl/Rumble phenomenon in RQL combustion chambers. Therefore, an air injection system is investigated for the generation of equivalence ratio and entropy waves in the combustion chamber. With common acoustic measurement procedures and an innovative optical measurement, the air injection system is characterized. Based on the experimental results, the performance of the module is evaluated.

Figure 1: Lean combustion zone in the RQL combustion test rig

Your Tasks

- Determination of the acoustic transfer behavior of the air injection system
- Integration of the air injection system into the RQL test rig
- Performance evaluation with Background Oriented Schlieren

Our Requirements

- Basic knowledge of fluid mechanics and thermodynamics
- Ability to work independently
- Experience in LabVIEW
- Optional: Knowledge about acoustics or even thermoacoustics

Our Offer

- Gain insight in the fascinating research field of combustion instabilities/thermoacoustics
- Working on highly relevant topics within an international research team

Contact

If you have any question or are interested in working in our team, please send your application to Thuy An Do (thuyan.do@tum.de).

Publication date
10th November 2023