Calibrated Thrust Measurement for Rotating Detonation Engines

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Overview/Introduction

● Advanced Propulsion, Energy, and Combustion Science (APECSSLab) is focused on the research and development of detonation-based propulsion technology.
● For small-scale rotating detonation rocket engine (RDRE) testing, an existing rocket test stand had to be reconfigured.
● By reducing the thickness of the flexures and installing appropriately sized thrust load cells, the test stand is optimized for small-scale RDRE performance characterization.

Explanation/Conceptual Framework

● A flexure is designed to allow bending constrained on a single axis in reaction to the generated rocket thrust [1].
● The original flexures were fabricated for 500 lbf maximum thrust, however, this is not compatible with small-scale RDRE tests upwards of 50 lbf.
● To address this issue, new flexures were sized, machined, and installed.

Key Findings/Results

● Once the original flexures were replaced with thinner configurations, the stiffness of the test stand has been reduced, allowing for the low level thrust produced from small-scale rockets to be measured.

Impact/Conclusions

● By reconfiguring the test stand for small-scale RDRE testing, APECSSLab will be able to quantify engine performance towards the development of advanced detonation-based propulsion systems for in-space applications.

References


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