

Faculty of Engineering

Summer Research Program 2022-2023

Project Title: Rocket Nozzle Resonance

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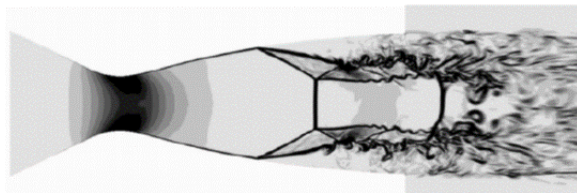
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Objective

The objective of this project is to investigate mechanisms of aeroacoustic resonance that can form in rocket nozzles during startup. These resonances can cause fluctuating side loads that can lead to catastrophic launch failure.

Project Details

During startup, a complex interactions between shock structures and boundary layers can result in a shock separation within the nozzle:



This separated shock can move in an unsteady fashion, and when it does so it may couple with the rocket exhaust to produce strong pressure waves at a single frequency. These pressure waves can cause unsteady loads on the nozzle, producing significant mechanical stress that can result in catastrophic failure.

In this project, you will apply experimental and theoretical tools to the study of this complex phenomenon, attempting to build and test physics-based models for the prediction of resonance occurring.

Prerequisites

Third year fluid mechanics unit (either mechanical, aerospace, or equivalent)

Additional Information

Give any additional information here – eg. ‘applicants may be required to attend an interview’. *(Delete if not applicable)*

Submit as a word document - no more than one page long.