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# Investigation of the Onset Cavitation in Additively Manufactured Venturis

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Faculty or Research Mentor:

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First time RCEU Mentor

Project Summary

Venturis are pivotal parts in liquid rocket engines. They measure the flow of propellants to an engine or control/restrict the flow to certain devices in the engine. This control/restriction mechanism for these devices is cavitating flow. With the advent of additive manufacturing, surface roughness of these manufactured parts is much higher than that of machined parts. This can affect the flow in these manufactured articles and affect the onset of cavitation in the device. This project will be to create a 2-D venturi test article to be used with the Propulsion Research Center High Pressure Spray Facility to investigate water flow at different upstream pressures through test section of varying roughness's and throat diameters. This will be include analyzing the onset mechanism of cavitation in each test section with the fluid by way of high speed video analysis and sensing packages.

Student Prerequisites

Fluids MAE 330/310 or equivalent
Intro to Computational Tools MAE 111/211 or equivalent
Minimum 3.0 GPA

Student Duties

The student will be working alongside the facility engineer, research engineer, and or a graduate student on the process of designing the test section and performing the requisite flow tests and processing the data to give direction on the effects of additive manufacturing on flow control devices. Tests will be performed on the PRC High Pressure Spray Facility. Data logging and analysis is suggested to be performed using LabView and/or MATLAB.

Mentor Supervision and Interaction

The student will be working alongside a graduate student or research engineer with routine check-ins at multiple points in the design, test, and analysis process. The student will be required to present their design and test procedure to a group of graduate students and engineers for critical review and input. At the end of the RCEU, the student will be required to write up a synopsis report on the findings and project methodology for historical documentation to allow for further development.