

Fluid Control in Rocket Injectors with the Use of Pressurized Systems for Throttling

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Throttling a rocket is a necessary task that must be accomplished in order to achieve proper efficiency and performance over a desired thrust range. Simply put, throttling is achieved by managing the fluid flow in a rocket injector in order to insure proper functioning. There are several different methods on how to throttle rockets, but a simple and inexpensive method is desired in some applications, such as student built University projects. A hot fire test of a hybrid rocket motor was conducted at Purdue University in May 2013, after which a throttling method was desired. The method proposed in this document outlines the use of a pressurized system to deliver oxidizer fluid. A modified throttling valve is utilized to manage oxidizer flow rate in a hybrid rocket engine by altering the pressure gradient. The goal of throttling this rocket will be to maintain a proper oxidizer to fuel (O/F) ratio by decreasing the mass flow rate of the oxidizer in a pressurized nitrogen system. Upon cold flow and hot-fire testing, results and data will provide insight on further design modifications to insure proper performance of the hybrid rocket engine mentioned above. Additional work on this topic will need to be done after the planned tests of summer 2013.