

45th STUDENT CONFERENCE (E2)
Student Conference - Part 2 (2)

Author: Mr. Christopher T. Lyne
Vanderbilt University, United States, christopher.t.lyne@vanderbilt.edu

DESIGN AND TEST OF A 10N HYDROGEN-PEROXIDE MONOPROPELLANT THRUSTER

Abstract

In recent years, hydrogen peroxide has received increased attention as a green propellant for use in reaction control thrusters on short duration missions, due to its low toxicity and high specific impulse. In this paper, an analytical framework is developed and applied to the design of a 10N hydrogen peroxide thruster. The results of ground based testing are presented for continuous and pulsed operation, and thrust measurements are compared to analytical predictions. Transients in pressure and thrust are investigated, with an emphasis on the key performance metrics for reaction control thrusters. Transient rise and fall times are presented and thermal effects are examined. Flow visualization of the nozzle exhaust is shown to qualitatively demonstrate over-expansion in the nozzle, in agreement with analytical predictions.