



Experimental Investigation of Augmented Spark Ignition of a LO₂LCH₄ Reaction Control Engine at Altitude Conditions

By -

Bibliogov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 46 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. The use of nontoxic propellants in future exploration vehicles would enable safer, more cost-effective mission scenarios. One promising green alternative to existing hypergols is liquid methane (LCH₄) with liquid oxygen (LO₂). A 100 lbf LO₂LCH₄ engine was developed under the NASA Propulsion and Cryogenic Advanced Development project and tested at the NASA Glenn Research Center Altitude Combustion Stand in a low pressure environment. High ignition energy is a perceived drawback of this propellant combination; so this ignition margin test program examined ignition performance versus delivered spark energy. Sensitivity of ignition to spark timing and repetition rate was also explored. Three different exciter units were used with the engine's augmented (torch) igniter. Captured waveforms indicated spark behavior in hot fire conditions was inconsistent compared to the well-behaved dry sparks. This suggests that rising pressure and flow rate increase spark impedance and may at some point compromise an exciter's ability to complete each spark. The reduced spark energies of such quenched deliveries resulted in more erratic ignitions, decreasing ignition probability. The timing of the sparks relative to the pressure/flow conditions also...



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