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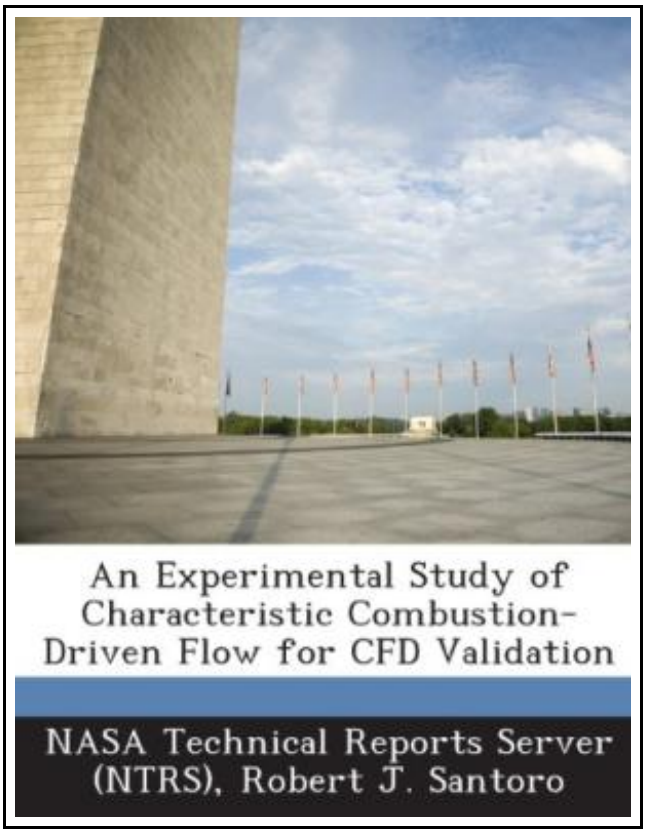

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AN EXPERIMENTAL STUDY OF CHARACTERISTIC COMBUSTION-DRIVEN FLOW FOR CFD VALIDATION

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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 130 pages. Dimensions: 9.7in. x 7.4in. x 0.3in.A series of uni-element rocket injector studies were completed to provide benchmark quality data needed to validate computational fluid dynamic models. A shear coaxial injector geometry was selected as the primary injector for study using gaseous hydrogenoxygen and gaseous hydrogenliquid oxygen propellants. Emphasis was placed on the use of non-intrusive diagnostic techniques to characterize the flowfields inside an optically-accessible rocket chamber. Measurements of the velocity and species fields were obtained using laser velocimetry and Raman spectroscopy, respectively Qualitative flame shape information was also obtained using laser-induced fluorescence excited from OH radicals and laser light scattering studies of aluminum oxide particle seeded combusting flows. The gaseous hydrogenliquid oxygen propellant studies for the shear coaxial injector focused on breakup mechanisms associated with the liquid oxygen jet under sub-critical pressure conditions. Laser sheet illumination techniques were used to visualize the core region of the jet and a Phase Doppler Particle Analyzer was utilized for drop velocity, size and size distribution characterization. The results of these studies indicated that the shear coaxial geometry configuration was a relatively poor injector in terms of mixing. The oxygen core was observed to extend well downstream of the injector and a significant fraction of the mixing occurred in the near nozzle region where measurements were not possible to obtain Detailed velocity and species measurements were obtained to allow CFD model validation and this set of benchmark data represents the most comprehensive data set available to date As an extension of the investigation, a series of gasgas injector studies were conducted in support of the X-33 Reusable Launch Vehicle program. A GasGas Injector Technology team was formed consisting of the Marshall Space Flight Center, the NASA Lewis Research Center, Rocketdyne...

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