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DESIGN, MANUFACTURING AND TESTING OF 50 MM SOLID ROCKET MOTOR USING NON-HTPB COMPOSITE PROPELLANT FOR POTENTIAL IN-ORBIT APPLICATIONS.

Abstract

A 50 mm solid rocket motor is developed over a 2 year research and development program in support of potential orbital flight applications (orbit braking, orbit rising etc.) A non-HTPB propellant is developed in-house and prepared in several batches for test firing campaign. A series of test firings are undertaken while measuring thrust and combustion pressure. Experimental results are shown to be in excellent agreement with the numerical simulations. Numerical simulations are undertaken using an in-house FORTRAN based code suite that covers interior ballistic design, thermo-structural design and thermochemical evaluation. The structure of the codes is shown and discussed in the context of supporting the design, manufacturing and testing of the 50 mm solid rocket motor. Transient ignition and shut-down times are shown both from theoretical and experimental data sets and an interpretation of their values and the possibility of further refinement is shown.