

Design and Burnback Analysis of Three Dimensional Modified Star Grain

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Abstract : The determination of grain geometry is an important and critical step in the design of solid propellant rocket motor. In this study, the design process involved parametric geometry modeling in CAD, MATLAB coding of performance prediction and 2D star grain ignition experiment. The 2D star grain burnback achieved by creating new surface via each web increment and calculating geometrical properties at each step. The 2D star grain is further modified to burn as a tapered 3D star grain. Zero dimensional method used to calculate the internal ballistic performance. Experimental and theoretical results were compared in order to validate the performance prediction of the solid rocket motor. The results show that the usage of 3D grain geometry will decrease the pressure inside the combustion chamber and enhance the volumetric loading ratio.

Keywords : burnback analysis, rocket motor, star grain, three dimensional grains

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