

Burnback Analysis of Star Grain Using Level-Set Technique

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Abstract : In order to reduce the hefty cost involved in terms of time and project cost, the development and application of advanced numerical tools to address the burn-back analysis problem in solid rocket motor design and development is the need of time. Several advanced numerical schemes have been developed in recent times, but their usage in the design of propellant grain of solid rocket motors is very rare. In this paper, an advanced numerical technique named the Level-Set method has been utilized for the burn-back analysis of star grain to study the effect of geometrical parameters on ballistic performance indicators such as solid loading, neutrality, and sliver percentage. In the level set technique, simple finite difference methods may fail quickly and require more sophisticated non-oscillatory schemes for feasible long-time simulation. For internal ballistic calculations, a simplified equilibrium pressure method is utilized. Preliminary results of the operative conditions, for all the combustion time, of star grain burn-back using level set techniques are compared with published results using CAD technique to test the developed numerical model.

Keywords : solid rocket motor, internal ballistic, level-set technique, star grain

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