

Abstract Title

F. Chalhoun^{1,2}, D. Trache², M. Benziane¹

¹Ecole Supérieure du Matériel, BP 12000, El-Harrach, Algiers, Algeria.

²Ecole Militaire Polytechnique, BP17 - 16046 Bordj El-Bahri, Algiers, Algeria.
chalghoumfateh@gmail.com

Abstract

Composite solid propellants (CSPs) are an important class of solid propellants widely used in military and civilian applications. The search for a longer range requires the development of new materials to improve the energy performance of solid propellants. The almost universally formulation used in CSPs contains PA / PBHT / Al. However, some disadvantages are often encountered, in this case, the phenomena of agglomeration of aluminum during combustion, the release of HCl which causes problems of discretion in addition to environmental problems, and the generation of a high concentration of alumina in the combustion products thus causing mechanical erosion at the nozzle. metal hydrides, widely used for a wide range of applications, have received a lot of attention from the scientific community as promising metal fuels for CSPs. In this study, theoretical performances of some composite solid propellants have been evaluated by NASA-CAE thermochemical computer program. Aluminum and numerous complex metal hydrides are the combustible additives for the investigated CSPs. gravimetric specific impulse (Isp) is the main energetic parameter used to optimize propellant formulations. Another criteria applied to evaluate performance of CSPs is “high performance halide scavenger” (HPS) parameter. The highest performance propellants have been obtained by the use of LiAlH₄, Mg₂FeH₆ and LiMgH₆ in CSPs formulations as energetic additives.

Keywords: composite solid propellant, complex metal hydride, NASA-CAE thermochemical computer program