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RESEARCH ON ABLATION CHARACTERISTIC OF EPDM INSULATOR IN USE OF DIFFERENT  
PROPELLANT**Abstract**

Ethylene Propylene Diene Monomer (EPDM) composite is a good internal insulating material for Solid Rocket Motors (SRM) by virtue of various advantageous features, such as low density, low ablation rate, high thermal decomposition temperature, high specific heat, low brittle temperature, good aging resistance, and its tensile strength and elongation are in full accord with those required for this application. EPDM insulator will occur phenomenon of pyrolysis and carbonization under the condition of high temperature gas, especially in the working process of SRM overload, with the function of high temperature gas and high particle concentration. On the one hand, due to the high density heat intensified chemical ablation of the EPDM insulator, on the other hand, the high particle concentration would have a certain degree of mechanical erosion as well.

In this paper, the ablation characteristics of EPDM insulator using different propellant conditions were studied, through the way of numerical simulation and experimental study based on a lab-scale SRM which can adjust particle concentration, impacting angle and speed. Acquiring the influence regularity between charring ablation rate and propellant formulation. By scanning electron microscopy (SEM) analysis of the microscopic structure of char layer, the coupling relationship between thermochemical ablation and particle erosion under the condition of different propellant was acknowledged.

The result shows that the charring ablation rate change dramatically with the content change of interaction of ammonium perchlorate with Octogen (HMX) and Hexogen (RDX) during decomposition, and there are huge discrepancies in the cross section of charring layer, erosion modes and destroy mechanisms of different propellant condition. Compact/loose structures was formed in charring layer of EPDM insulator.