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DEVELOPMENT OF ENVIRONMENTALLY FRIENDLY SOLID PROPELLANTS USING FUSED
DEPOSITION MODELING ADDITIVE MANUFACTURING

Abstract

Solid propellants play a crucial role in rocket propulsion systems, but traditional formulations often raise concerns regarding toxicity and environmental impact. This study explores the feasibility of producing environmentally friendly solid propellants using Fused Deposition Modeling (FDM) additive manufacturing techniques. By leveraging FDM's flexibility, researchers can select thermoplastic materials with low toxicity and environmental impact, such as biodegradable polymers derived from renewable resources. These materials are supplemented with eco-friendly additives, including plasticizers and combustion catalysts, to enhance performance and reduce emissions. The optimization of FDM manufacturing parameters ensures consistent production of solid propellants with desired properties, including combustion efficiency, structural integrity, and dimensional accuracy. Rigorous testing and characterization validate the performance and suitability of these green solid propellants for rocket propulsion applications, paving the way for sustainable advancements in aerospace technology.