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Author: Mr. shixiong song
College of Astronautics, Northwestern Polytechnical University, China, songshx1015@163.com

Mr. Quanbin Ren
Academy of Aerospace Solid Propulsion Technology, China Aerospace Science and Technology Corporation (CASC), China, songshx1015@163.com
Mr. Min Tang
Academy of Aerospace Solid Propulsion Technology, China Aerospace Science and Technology Corporation (CASC), China, songshx1015@163.com
Mr. Yanjun Bai
The 41st Institute of the Fourth Academy, China Aerospace Science and Technology Corporation (CASC), China, songshx1015@163.com
Mr. Yang Liu
The 41st Institute of the Fourth Academy, China Aerospace Science and Technology Corporation (CASC), China, songshx1015@163.com

PERFORMANCE OF SOLID ROCKET PROPELLANT GRAIN ON 3D PRINTING

Abstract

3D printing technology is based on digital model files. It is a manufacturing technology that stacks special metal materials, non-metal materials and other materials layer by layer according to extrusion, sintering, melting, light curing, spraying, etc., to produce physical objects. . 3D printing technology has become a key technology to improve the design and manufacturing capabilities of spacecraft, and its application in the aerospace field continues to expand, fully demonstrating the application prospects of 3D printing technology. The existing solid propellant is mainly manufactured by mixing and pouring, but due to the limitations of technology and equipment, it has obvious disadvantages in the formation of grains with complex structures. With the development of 3D printing technology, effective solutions are provided for the above-mentioned problems. Solid propellant 3D printing technology is a new concept technology, which provides the possibility to break through the status quo of complex structure grains that are difficult to accurately shape. The main work of this article is as follows: In order to realize the 3D printing and molding of butylated hydroxy solid propellant, the conventional HTPB/AL/AP formula was adopted to carry out the adaptability study on the adhesive system, and the photoinitiator was screened out and its content was determined. Based on the above formula, the solid propellant 3D printing process is quickly shaped (setting time is about 20s), and the solid propellant specimens with a solid content of 80The results show that butylated hydroxy solid propellant can be manufactured by 3D printing. Its performance is similar to that of conventional butylated hydroxy solid propellant. It has the advantages of rapid shaping and dexterous molding. It can be used in the formation of complex structure grains or the flexible manufacturing of solid rocket motors. It has good development prospects.