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Author: Mr. song yan
Xi'an Aerospace Propulsion Institute, China, ys060599@126.com

Prof. Bin Li
Xi'an Aerospace Propulsion Institute, China, CASClabin@vip.sohu.com

Prof. Feng Li
Xi'an Aerospace Propulsion Institute, China, lfsd11@aliyun.com

Mr. Quanjie Yang
China, faceast@163.com

STRUCTURAL DYNAMIC ANALYSIS OF 18,000-KG THRUST LOX/KEROSENE ENGINE

Abstract

The 18,000-kg thrust staged combustion cycle LOX/Kerosene engine has been successfully developed at Xi'an Aerospace Propulsion Institute. As a second stage engine of china's new generation launch vehicle, it is suffered from vibration loads transmitted through the vehicle during steady state operation of the first stage engine. So the structural dynamic characteristics of engine determine its structural integrity. The engine frame was modified to improve its structural dynamic characteristics during the design process. A modal test was carried out and modal parameters including natural frequencies, mode shapes less than 200Hz were obtained. A finite element model of the engine consisting of nozzle, combustion chamber, turbopump, etc was developed. Hard work was made to tune the finite element model according to test results and the detailed simplified methods were described. After the single engine model was established, the finite element model of four parallel connected engines, used for the second stage of new generation medium-sized rocket launch vehicle, was built up. The effectiveness of the model was also validated by the four parallel connected engines modal test.