

SPACE PROPULSION SYMPOSIUM (C4)
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LOX/LH2 ROCKET ENGINE HEALTH MANAGEMENT APPLICATIONS OF VIBRATION
ANALYSIS TECHNOLOGY

Abstract

LOX/LH2 rocket engine need to be delivered after calibrate fire test to satisfy the precision of entering orbit for rocket. In our country, to ensure performance parameters and engine reliability, relieve cost and shorten the delivering cycle, it has been achieved to deliver without reassemble after calibration fire test of LOX/LH2 rocket engine. Ro realize it, the most important thing is that the health status of the engine can be adequately evaluated. In addition, for the research and development tests and long duration tests, we need continue to do the next fire test for engine without disassembling from the test-bed for the purpose of relieving research cost and shortening the development cycle. So we also need to evaluate the health status of the engine well and truly. As a kind of most important means, vibration analysis technology was largely used for the health status evaluation of the engine especially the high-speed turbo-pump. Engine health management system based on vibration data was built and evaluation rules were established as a criterion for a special engine. A new analytical method combining with the wavelet analysis and short-time Fourier transform was also presented to analyze the vibration signal of the high-speed bearings in turbo-pumps. This method had been verified with much fire test data that bearing cage fault can be effectively detected. A mass of cases show that vibration analysis technology is very important to the engine health status evaluation. With the development of sensors and signal analysis technology, it will bring more important contribution to the test and flying safety with more and more applications for the health management and fault diagnosis of LOX/LH2 rocket Engine.