Paper ID: 16924
oral

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Poster Session (P)

Author: Dr. Aijun Ma
China Astronaut Research and Training Center, China, 163507net@163.com

Mr. Meng Shi
China, dreamstoney@sohu.com
Mrs. Hongying Liu
China, lhy507@yahoo.com.cn
Mrs. Xuemei Feng
China, fengxuemei507@yahoo.com.cn
Mr. Rui Dong
China, 396967456@qq.com

RESONANT FIXTURE DESIGN AND TEST VERIFICATION ON SHAKER SRS TEST

Abstract

Space devices are often subjected to pyroshock events, such as an explosive charge to separate two stages in a multi-stage rocket or to separate the spacecraft itself from the base stage booster. As a result, system devices must be qualified to this severe environment. The severity of a pyroshock environment is usually characterized using a shock response spectrum (SRS). Recently, increased numbers of customers are asking the electrodynamic shaker facility to meet the SRS test requirements because the shaker is controllable and repeatable; however, the limitation of the armature amplitude and power amplifier voltage restricts shaker's applicability. In order to improve the SRS test potential of a shaker, a resonant fixture is designed according to the knee frequency of the SRS by using the finite element method. The finite element model of a shaker armature and the resonant fixture is established for predicting the fixture's dynamic response to pyroshock loadings. A real resonant fixture is manufactured by the guidance of the numerical simulation results. The resonant fixture is utilized to achieve a SRS testing; the test results are compared with those obtained by using a conventional fixture. The test data show that the designed resonant fixture can double the shaker's SRS test capability.