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OPTIMIZATION OF HIGH DAMPING COMPOSITE FIXING PANEL FOR LAUNCH VEHICLE
ELECTRONIC APPARATUS

Abstract

The structure/damping cocured composites is a new technique developed about 25 years ago. By applying the structure/damping cocured composites into the structure, the mode damping factor of the structure is obviously increased, and the magnification and respond of the structure vibration is decreased and its mass is also greatly reduced. The structure/damping cocured composites are not only with a high rigidity and strength, but also have a higher damping factor. These would provide a better environment for the instrument installed on the structures. Therefore, it is a good vibration-reduction treatment method and with a prospective application in the field of aerospace industry. This paper developed a new kind of electronic apparatus installed panel for important electronic apparatus of one type of our launch vehicle, which was made of aluminum alloy initially, and was heavy and had a small damping factor. The maximum resonance magnification on the electronic apparatus reached 25 times when conducting the vibration tests in the laboratory and the apparatus installed on the panel could not work properly. Then the primary structure was designed according to the technical requirements, and its FEA model was set up. We analyzed the structural parameters and optimized the structural design. Eventually, the panels were made from carbon fiber reinforced epoxy resin composite, and damping films made from nitrile butyl rubber were plied along the thickness direction, and four rubber vibration isolators were used to install the panel. The FEA calculation results were well agreed with the results of the tests, which reached the demands of design and achieved a good effect. The maximum resonance magnification on the electronic apparatus decreased fom 25 times to 5.9 times. And the respond of vibration at high frequency is greatly decreased and its mass is reduced about 40Key words: structure/damping cocured, damping, composite, aerospace,optimization