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**PROCEEDINGS**

# Vibration Characteristics of Multilayer Airborne Equipment Integrated Platform

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**ABSTRACT**

With the improvement of aircraft design requirements, the development of airborne equipment towards lightweight, miniaturization and weight reduction has brought great challenges to the structural design of airborne equipment. Usually, airborne equipment needs to be connected to the fuselage through supporting brackets. In the process of airplane flight, due to the influence of vibration and other complex load conditions, the mounting bracket of airborne equipment is prone to damage caused by the unreasonable structural design of airborne equipment. Some sensitive airborne electronic equipment has special requirements for the dynamic characteristics of the bracket. Therefore, the advantages and disadvantages of the power characteristics of the mounting bracket for airborne equipment are related to the structural safety of the airframe and the reliability of the equipment. At the same time, due to the large number of various types of airborne equipment, their supporting brackets will also bring additional impacts on the aircraft structural design, weight reduction, maintenance and so on. Therefore, from the perspective of modern aircraft reliability design and weight reduction purposes, the airborne equipment usually adopts the integrated platform design, i.e., placing an aluminum alloy frame-type multi-layer platform in the limited space of the fuselage, and a number of airborne equipment is reasonably fixed on this platform in layers. This type of platform is characterized by light weight, low cost and good maintainability.

Random vibration test is an important part of the dynamic environment test of inspection equipment, along with the rapid development of computer technology in recent years, numerical analysis of random vibration in aerospace has a large number of successful applications. In this paper, we analyze the vibration characteristics of multi-layer airborne equipment integration platform by combining vibration test and simulation, and construct a dynamic simulation model of airborne equipment integration platform to provide reference and basis for the subsequent establishment of virtual test model. Through vibration testing and simulation methods, the vibration characteristics of multilayer airborne equipment integrated platform were analyzed. The experimental and simulation results indicate that the lower order modes of the platform are related to the stiffness of the shock absorber; In X-direction vibration, the first mode of the platform plays a major role; In the Y and Z direction vibration, the second and third order modes of the platform play a major role; The simulated RMS value of the equipment basically consistent with the experimental value, which can provide reference for subsequent virtual experimental models.

**KEYWORDS**

Modal analysis; shock absorber; frequency response; RMS value; virtual experimental model

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