Analysis and Verification of Flight Control System-Helicopter Vibration Coupling Postprint

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Abstract

Coupling between the flight control system and the helicopter can induce or aggravate helicopter vibrations. In China, there is limited understanding of vibration problems arising from such coupling, and systematic introductions are lacking. When related issues occur, troubleshooting often requires step-by-step investigation from various directions, consuming substantial manpower and time, thereby affecting development schedules. This study, from the perspective of helicopter vibrations, expounds upon two models of coupling between flight control systems and helicopters, classifies vibration problems resulting from coupling, analyzes the typical frequency characteristics of the two major categories of problems, and summarizes the mechanisms of coupling problems and key influencing factors. General solutions are proposed for vibration problems arising from mutual coupling between flight control systems and helicopters. Taking an actual problem of a certain helicopter model as an example, the severity of vibration problems caused by mutual coupling is illustrated, the key pathways and affected frequency ranges of such coupling are further analyzed, and the effectiveness of the proposed general solutions is demonstrated, which can provide reference for the rapid handling of vibration problems arising from mutual coupling between flight control systems and helicopters.

Full Text

Preamble

Note on Source Material Integrity

The source document provided for translation contains extensive corruption, including character encoding errors, optical character recognition (OCR) artifacts, and other forms of data degradation. Upon thorough analysis, no recoverable Chinese-language content suitable for academic translation could be identified within the text. Consequently, a meaningful translation cannot be produced.