Determination of modal characteristics and calculated analysis of ensuring the aircraft flutter safety

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This work investigates the aircraft dynamic aeroelastic characteristics. The authors have constructed both the elastic-mass and aerodynamic models of the product using the MSC.Nastran / Flight Loads software package. Based on the flight tests results we have obtained and verified the parameters of the dynamic aeroelastic characteristics. The critical speed of the flutter is calculated. The study shows that under the certain modes of flight the required margin for the dynamic aeroelastic stability of the structure is not ensured. We propose the options for balancing the aircraft rudder. The paper solves the flutter problem as well as the problem of the dynamic aeroelastic instability of the experimental sample of the product revealed during the flight tests. The authors have developed a technique allowing us to simulate the operation of the aircraft steering system on the elastic structure by means of the integration of various calculation packages taking into account the impact of the relative airflow. Findings of the research made it possible to improve the aircraft control algorithms in order to get the required aircraft performance.

Keywords: *modal characteristics, aircraft, finite-element simulation, natural oscillations, flutter, aeroelastic stability*

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