General Rotorcraft Aeromechanical Stability Program (Grasp): Theory Manual (Paperback)

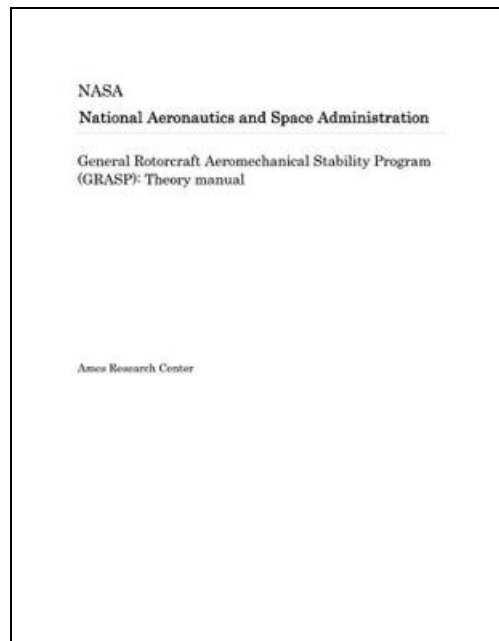NASA

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(Dr. Teagan Beahan Sr.)

GENERAL ROTORCRAFT AEROMECHANICAL STABILITY PROGRAM (GRASP): THEORY MANUAL (PAPERBACK)

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Independently Published, United States, 2018. Paperback. Condition: New. Language: English. Brand new Book. The general rotorcraft aeromechanical stability program (GRASP) was developed to calculate aeroelastic stability for rotorcraft in hovering flight, vertical flight, and ground contact conditions. GRASP is described in terms of its capabilities and its philosophy of modeling. The equations of motion that govern the physical system are described, as well as the analytical approximations used to derive them. The equations include the kinematical equation, the element equations, and the constraint equations. In addition, the solution procedures used by GRASP are described. GRASP is capable of treating the nonlinear static and linearized dynamic behavior of structures represented by arbitrary collections of rigid-body and beam elements. These elements may be connected in an arbitrary fashion, and are permitted to have large relative motions. The main limitation of this analysis is that periodic coefficient effects are not treated, restricting rotorcraft flight conditions to hover, axial flight, and ground contact. Instead of following the methods employed in other rotorcraft programs. GRASP is designed to be a hybrid of the finite-element method and the multibody methods used in spacecraft analysis. GRASP differs from traditional finite-element programs by allowing multiple levels of substructure in which the substructures can move and/or rotate relative to others with no small-angle approximations. This capability facilitates the modeling of rotorcraft structures, including the rotating/nonrotating interface and the details of the blade/root kinematics for various types. GRASP differs from traditional multibody programs by considering aeroelastic effects, including inflow dynamics (simple unsteady aerodynamics) and nonlinear aerodynamic coefficients. Hodges, Dewey H. and Hopkins, A. Stewart and Kunz, Donald L. and Hinnant, Howard E. Ames Research Center AERODYNAMIC STABILITY; AEROELASTICITY; DYNAMIC STRUCTURAL ANALYSIS; FINITE ELEMENT METHOD; HOVERING; ROTARY WING AIRCR.

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