

A DETAILED STUDY OF PANEL FLUTTER STABILITY FOR THE FIRST BRAZILIAN SATELLITE LAUNCHER MAIN FAIRING

J. G. Damilano and João L. F. Azevedo
Instituto de Aeronáutica e Espaço
Centro Técnico Aeroespacial
CTA/IAE/ASE
12228-904 – S. J. Campos – SP – BRAZIL

Keywords: *VLS, Panel flutter, Piston theory, Payload fairing, Launch vehicles.*

Abstract

The paper describes panel flutter analyses performed in the context of the development of the first Brazilian satellite launcher (VLS). The development of the structural-dynamic and aerodynamic formulations are presented to obtain the corresponding aeroelastic equations. Initially, two different approaches were used to describe the aerodynamic loading, namely formulations based on the quasi-steady, linearized, small perturbation potential equation and on 1st-order piston theory. Analyses herein presented also used 3rd-order piston theory, but the details of the formulation are omitted. A Rayleigh-Ritz approximation and the finite element method are used in the analyses. Results are presented for the VLS main aerodynamic fairing panels. The effect of the inclusion of the unsteady aerodynamic terms in the aeroelastic loading as well as the flexibility of the panel supports are also investigated. The overall conclusion of the study indicates that the VLS payload shroud would be free from panel flutter.