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Estimation of damping derivatives for delta wings in hypersonic flow for straight leading edge (Article)

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Abstract

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Accurate estimation of the aerodynamic stability derivatives of airplanes is essential to evaluate the performance of the aircraft, whether civilian or military. Theoretical prediction methods for the dynamic stability derivatives at high angles of attack have not advanced, and in the present paper, an attempt has been made to study the effect of damping derivatives for delta wings for different angles of incidence, and the Mach number for a wing whose leading edge is straight . In this paper, the flow is considered to be unsteady flow and also considering the effect of the Leeward surface along with the shock waves and the expansion waves. The theory developed in the present paper considering the unsteady effects, the results have been estimated for speed flows for air assuming the air to behave as perfect gas for a range of angle of incidence and the inertia level. The results show that for Mach number M = 7 and above the damping derivatives becomes independent of inertia level. Increase in the damping derivatives is substantial when the angle δ is increased from 5 to 10 degrees. © TJPRC Pvt. Ltd.

SciVal Topic Prominence

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