

EFFECT OF FLARE ANGLE AND NATURAL VENTILATION ON THE AERODYNAMIC CHARACTERISTICS OF A TYPICAL RE-ENTRY BODY AT SUBSONIC AND TRANSONIC MACH NUMBERS

G.K. Suryanarayana

Scientist

National Aerospace Laboratories (NAL)

Council of Scientific and Industrial Research (CSIR)

Kodihalli, Post Box No. 1779

Bangalore – 560 017, India

Email: surya@nal.res.in

Abstract

Aerodynamic force and moment measurements were carried out on models of a typical re-entry body, featuring a blunt nose, conical body and flare, to assess the effect of flare angle on the overall aerodynamic characteristics. In one of the configurations, the junction between the cone and the flare was vented out to the base of the model to assess the effect of ventilation on the aerodynamic characteristics. It was expected that the stability characteristics would improve, by virtue of improved contribution from the flare to the normal force of the configuration. However, measurements did not show the expected trends. Instead there was a remarkable reduction in the axial force with ventilation, by as much as 25% all across the Mach number and angle of attack range. Base pressure measurements indicated that in the low Mach number range pressure rise occurred. However, in the high transonic Mach number range, even though the force measurements showed drag reduction, there was no significant rise in base pressure. Ventilation showed delay in transonic drag rise. It is therefore suggested that the overall pressure field is modified by ventilation, which results in drag reduction of the configuration.

Keywords: *Bluff body drag reduction, Natural ventilation*

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