THE COMPUTATION OF STIFFNESS DERIVATIVE FOR
AN OGIVE IN THE HYPERSONIC FLOW

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ABSTRACT

Expression for Stiffness derivative for an Ogive is derived with the suppositions of the arc on the nose of the cone from the air is being considered as perfect gas and the viscosity being neglected, the motion is quasi-steady, and the nose deflection angle of the Ogive $\theta$ is in such a way that the $M_2$ after the shock is $> 2.5$.

It is seen that due to the increment in angle $\theta$, the stiffness derivative increases linearly due to the progressive increase in the plan form area of the nose shape. The results indicate that there is a 38 percent increase in the stability derivative when the flow deflection $\theta$ was enhanced in the range of 5 to 10 degrees. With the further enhancement in the flow deflection angle $\theta$ from ten degrees and above, does not yield substantial increase in the stability derivative. Due to this change in the surface pressure distribution will lead to shift the location of centre of pressure, from the hinged position $h = 0.5$ to 0.8. The centre of pressure also has shifted towards the downstream, which lies in the range from $h = 0.72$ to 0.85.

KEYWORDS: Stability Derivative, Surface Pressure, Ogive, Stiffness Derivative & Pitch Angle

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