عنوان مقاله:

The Effects of Cross Section Variations on the Pressure Distribution around a Long Axisymmetric Body

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خلاصه مقاله:

In this study, the effects of presence of belts are experimentally studied for supersonic flow field around a long axisymmetric body. Also, the longitudinal and circumferential pressurecoefficients along with the boundary layer profile are investigated for angles of attack of -2 to 6 degrees. To this end, two conical-cylindrical belts were installed at middle and end parts of ogival cylinder model. To ensure the turbulent flow around the model, trip strip was used tocause artificial disturbances and the acquired results are compared with the acquired results from the model without a trip strip. To study the effects of the cross section variations on the pressure distribution and on the boundary layer profiles, three different belts with variousleading edge angles were installed at different locations along the cylindrical portion of the model. These belts caused major variations in both the surface pressure distributions and the boundary layer profiles. Passing of flow over the belt leads to sudden increases and decreasesin pressure coefficient distribution on the belt that is due to sudden cross section variations and consequent development of reverse flow or flow separation regions and production of vorticesalong the flow path. Also, the presence of belt causes the development of oblique shock wave on the model, which in turn reduces the Mach number downstream of the belt. Studying the circumferential pressure distribution reveals that the presence of belt leads to more asymmetricflow downstream the model which is intensified as the angle of attack increases. Since the experimental results are limited, the numerical simulation of the problem is also carried out to complete the acquired results from the experimental tests, the acquired results of which show good agreement with the experimental results.

کلمات کلیدی:

supersonic flow, pressure distribution, boundary layer tripping, cross section variation, long axisymmetric body