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Investigation of Görtler vortices in a hypersonic double compression ramp flow by means of infrared thermography

by F.F.J Schrijer*

*Faculty of Aerospace Engineering, Delft University of Technology, Kluyverweg 1, 2629 HS, Delft, The Netherlands, f.f.j.schrijer@tudelft.nl

Abstract

An experimental investigation is performed on the occurrence of Görtler vortices in a hypersonic flow by means of infrared thermography. A double compression ramp model with varying second ramp angle is tested at Mach 7.5 in a hypersonic Ludwieg tube. Due to the concave curvature of the streamlines in the separated region, a centrifugal instability exists that is responsible for generating stream-wise vortices. In the investigation vortices are generated with varying span-wise wavelengths by means of a comb-shaped element near the nose of the model. Using infrared thermography the amplification of these vortices is measured so that a critical wavelength and Görtler number can be identified. It is found that the vortex growth rate is the highest for the largest second ramp angle. Furthermore it is found that the growth rate decreases with increasing Görtler number.

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