

Wall Pressure Fluctuations in Naturally Developing Boundary Layer Flows on Axisymmetric Bodies

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Abstract : This paper investigates the characteristics of wall pressure fluctuations in naturally developing boundary layer flows on axisymmetric bodies experimentally. The axisymmetric body has a modified ellipsoidal blunt nose. Flush-mounted microphones are used to measure the wall pressure fluctuations in the boundary layer flow over the body. The measurements are performed in a low noise wind tunnel. It is found that the correlation between the flow regime and the characteristics of the pressure fluctuations is distinct. The process from small fluctuation in laminar flow to large fluctuation in turbulent flow is investigated. Tollmien-Schlichting wave (T-S wave) is found to generate and develop in transition. Because of the T-S wave, the wall pressure fluctuations in the transition region are higher than those in the turbulent boundary layer.

Keywords : wall pressure fluctuation, boundary layer flow, transition, turbulent flow, axisymmetric body, flow noise

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