UNIVERSITY OF MARYLAND

THE BURGERS PROGRAM FOR FLUID DYNAMICS
THE FLUID DYNAMICS REVIEWS SEMINAR SERIES

DYNAMICS OF FLOW UNSTEADINESS IN HIGH-SPEED DOUBLE CONES AND CYLINDERS

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DeWalt Seminar Room
2164 Glenn L. Martin Hall

Speaker

DR. SUBRAHMANYAM (SUBBU) DUVVURI

Assistant Professor of Aerospace Engineering
Indian Institute of Science

ABSTRACT

External flows in the high-speed (compressible) regime with regions of flow separation often present rich fluid-dynamical features. An aspect of such flows that is particularly interesting is temporal unsteadiness, which is typically driven by interaction of shock waves with flow regions of high shear and/or separation. In certain cases, the unsteadiness is characterized by periodic shock wave motion with large spatial amplitudes, which gives the flows a visually spectacular character!

This talk will present experimental studies at Mach 6 of two canonical flows that are characterized by shock-wave/separation-region interactions – one is flow over a double cone and the other is flow in the wake of a 2D circular cylinder. The double-cone flow exhibits two distinct states of unsteadiness, with large- and small-amplitude shock-wave oscillations. Physical mechanisms will be deduced from experimental results to explain the oscillations and the transition between flow states. Coherent flow oscillations are also found in the high-speed cylinder wake, with some broad similarities to small-amplitude shock-wave oscillations in the double-cone flow. The Strouhal number of the cylinder wake shows universal behavior, and further, oscillatory activity in the two statistically identical halves of the flow is anti-symmetric.

BIO

Dr. Subrahmanyam (Subbu) Duvvuri is an Assistant Professor of Aerospace Engineering at the Indian Institute of Science, where he leads the Turbulent Shear Flow Physics and Engineering Laboratory. He obtained a BTech degree in Aerospace Engineering from Indian Institute of Technology Madras, and MS and PhD degrees in Space Engineering and Aeronautics, respectively, from California Institute of Technology. Prior to his present position, he worked at Princeton University for two years as a Postdoctoral Research Associate.

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