応用計算力学セミナー

下記のようにセミナーを開催いたします。皆様のご参加をお待ちしています。

日時：2014 年 9 月 11 日（木）10:45～12:15
会場：創想館セミナールーム３（14-203）
申込：不要

APCOM Seminar 140911
Date and time: 11 September 2014 (Thu) 10:45-12:15
Place: Yagami Campus, Sosokan, Seminar Room 3 (14-203)
Speaker: Dr. Henny Bottini (Ecole Centrale Paris/von Karman Institute)
Title: Experimental Investigation of Induced Supersonic Boundary Layer Transition

Abstract
Oblique shock waves are the preferred solution to start compressing the flow entering the engine of a supersonic/hypersonic aircraft. These shock waves are generated by ramps upstream of the engine inlet entrance. To ensure an efficient compression, boundary layer separation along these ramps must be avoided. However, if the boundary layer is laminar, the impingement of an oblique shock wave usually causes a separation of non-negligible extent. To cope with this issue, fixed turbulence triggers can be located on the ramps to force and keep the boundary layer into the more robust turbulent state.

This seminar will illustrate some experimental studies carried out at the von Karman Institute for Fluid Dynamics on the effectiveness of single roughness elements of different heights in promoting transition to turbulence within a supersonic laminar boundary layer. A multiple-Mach-number supersonic wind tunnel was designed and qualified for this test campaign, and used for tests at Mach 1.6 and 2.3. A different facility for testing at Mach 2 was used to investigate the effects of an oblique-shock-wave impinging onto the wake of the roughness element.

Steady and unsteady wall temperature measurements were taken by thin-film gauges in the wake of the single roughness, along with unsteady wall pressure measurements by piezoelectric pressure transducers. Thin-film measurements allowed: 1) the tracking of the convective heat flux and the adiabatic-wall temperature spatial evolution downstream of the roughness element; 2) the characterization of the wall temperature fluctuations. Pressure measurements complemented this characterization by measuring the pressure fluctuations at the wall. Results from both types of

measurements taken in the test campaign at Mach 1.6 and 2.3 were used to conclude on the state of the boundary layer, thus on the effectiveness of the roughness element in promoting transition to turbulence. Results from wall temperature measurements taken in the Mach-2 test campaign were used to characterize the unsteady behavior of the roughness wake across the shock-impingement location.