THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學

Hong Kong Society of Theoretical and Applied Mechanics 香港力學學會

Joint PolyU ME/HKSTAM Distinguished Seminar

Oblique shock reflection of a shock wave from an axis of symmetry

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Date: **20 January 2016 (Wednesday)**
Time: **11:00 am – 12:30 pm** (Refreshment starts at 10:30 am)
Venue: M1603, The Hong Kong Polytechnic University.
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ABSTRACT

Regular shock reflection from an axis of symmetry is forbidden, because the incident-shock strength increases with decreasing distance from the axis. Examples of where shocks reflect from symmetry axes occur in practice will be shown. These include shock reflection at the shock tube end of a reflected shock tunnel, diffraction of a shock from a heavy bubble, rocket nozzle exhausts and scramjet intakes. They motivate theoretical considerations and numerical experiments to be used for studying the reflection of an initially conical shock. This problem is in the class of pseudo steady flows, in which all characteristic lengths increase linearly with time. It turns out that three different Mach reflection configurations can occur, two of which feature an embedded supersonic vortex. The three configurations of Mach reflection also occur in the steady-flow problem of a circular overexpanded supersonic jet, such as in a rocket nozzle exhaust, in which the shock wave from the lip of the jet reflects off the axis. In this case two of the configurations turn out to be oscillatory, and the embedded supersonic vortex can provide positive feedback that leads to hysteresis when the back pressure is varied in different directions.

Biography of Speaker

Professor Hans G. Hornung, an emeritus C.L. “Kelly” Johnson Professor of Aeronautics and Director of the Guggenheim Aeronautical Laboratory of Caltech, has been working on the study of supersonic/hypersonic flows for almost all of his career. Before being appointed in Caltech, he was the Director of the DFVLR-Institute for Experimental Fluid Mechanics of the German Aerospace Agency. Professor Hornung has made significant contributions in gas dynamics, notably Mach reflection and effects of dissociation, in separated flows, and in wind tunnel technology. As a well-recognized scholar in the fluid dynamics and aeronautical engineering community, he has been awarded as Fellow of the Australasian Fluid Mechanics Society, Fellow of the American Association for the Advancement of Science, Fellow of the American Institute of Aeronautics and Astronautics and Fellow of the Royal Aeronautical Society. He has also received the prestigious Fluid Dynamics Award of the American Institute of Aeronautics and Astronautics, and serves as the foreign member of the Royal Swedish Academy of Engineering Sciences.

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