THE UNIVERSITY OF MELBOURNE

2008 Miegunyah Public Lecture

Professor Alexander J Smits

Eugene Higgins Professor of Mechanical & Aerospace Engineering,

Chair, Department of Mechanical & Aerospace Engineering

Princeton University, NJ, USA

Thursday 7th August, 6.30pm

Harold Woodruff Theatre

Microbiology Building (no. 184)

The University of Melbourne

Turbulent Flow: From Forest Fires to Submarines.

Abstract:

Turbulence is intrinsic to fluid flow on every scale, from blood flow in the body to winds in the atmosphere. Stirring a coffee cup, filling a sink, driving a car, the flames in a fireplace or snowflakes in a storm, even breathing itself, are all circumstances where turbulent flows are important. Turbulent flows are characterized by eddying motions that cover a wide range of scales, from large eddies the size of the flow itself, to very small eddies that can be sub-microscopic. Each eddy scale plays a particular role in the mixing and energy dissipation due to turbulence, and although the basic equations needed to calculate a turbulent flow—the Navier-Stokes equations—have been known for more than 150 years, today's supercomputers are not powerful enough to simulate precisely all the eddies and their interactions (at least in all practical flows). When it comes to theory, turbulence has been called "the last great outstanding problem of classical physics." At present, all we have are some general concepts that may prove to be incorrect or incomplete. In this lecture, I will describe the features of turbulent flows that lead to its complexity, give some important examples, demonstrate the practical impact of our uncertain knowledge of turbulence, and describe why current research efforts may lead to success.

Biography:

Lex Smits is the Chairman of Mechanical and Aerospace Engineering and Director of the Gas Dynamics Laboratory at Princeton University. His research covers broad topics in fluid mechanics including supersonic and hypersonic flows, biologically-inspired propulsion, and turbulence. Professor Smits is responsible for the Princeton Superpipe, a world-leading turbulent flow facility from which a number of major breakthroughs have resulted in the past decade. Professor Smits received his PhD from the University of Melbourne in 1975.

MORE INFORMATION

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