



THE UNIVERSITY OF  
MELBOURNE

# Melbourne School of Engineering Sustainable Systems Seminar

SEMINAR SERIES 2008

## MERIT

### MELBOURNE ENGINEERING RESEARCH INSTITUTE

engineering research  
for the benefit of society

## Prof Peter A Monkewitz

Fluid Mechanics Laboratory,  
Swiss Federal Institute of Technology,  
Lausanne, Switzerland.

Thursday 14th August, 3pm

Brown Theatre  
Electrical & Electronic Engineering, Bldg  
193

4pm, Refreshments

Conference Room, Level 4, Bldg 170  
Mechanical Engineering

## Fundamental studies of fluid instabilities and turbulence - what do they contribute to energy technologies.

### MORE INFORMATION

For more Mechanical Engineering seminar  
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In this presentation an attempt will be made to show that fundamental research, apart from being amusing to academics, is more directly relevant to technology than commonly believed. An experimental study of diffusion flame instabilities near extinction is a first example. By validating theoretical results in a radically simplified setting, the experiments provide a better understanding of local extinction processes and pave the way for the conception of better flamelet models to optimize today's industrial lean combustors. As second example, a theory-inspired analysis of turbulent boundary layer experiments (boundary layer = the flow region next to a solid wall) is argued to be directly relevant to the prediction and minimization of the drag of many vehicles as well as the optimization of flow machinery used in energy conversion systems. In particular, the impact of a seemingly academic debate about model parameters on the scale-up of airplanes is demonstrated.

After graduating in physics from the Swiss Federal Institute of Technology in Zurich, he received his Ph.D. from the same institution in 1977 with a thesis on internal acoustics. From 1977-80 he was a research associate in the Aerospace Department of the Univ. of Southern California in Los Angeles, where he worked experimentally and theoretically on jet noise and hydrodynamic instabilities. In 1980 he joined the faculty of the School of Engineering at UCLA where he made research contributions in several areas. In the field of hydrodynamic instability he had a hand in the popularization of the concept of absolute instability in fluid mechanics, the development of the concept as well as of the asymptotic analytical description of global modes in nonparallel flows, and in the modelling of vortex shedding from bluff bodies. Other areas of research include internal acoustics, jet mixing, in particular in low-density jets in which he co-discovered with D. Bechert enhanced mixing by "side-jets," flow control, diffusion flame instabilities and, most recently, turbulence. In 1988 he was awarded the Humboldt prize and spent the academic year 1989/90 as Humboldt awardee at the Technical University in Berlin. In 1992 he was elected Fellow of the American Physical Society. Since 1993 he holds the chair for experimental fluid mechanics and heads the Laboratory of Fluid Mechanics (LMF) of the Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland. He has been Chairman of its Mechanical Engineering Department from July 1997 to December 2000, co-organizer of the 1999 "Research programme on turbulence" at the Isaac Newton Institute in Cambridge, UK, Associate Editor of the "Journal of Fluid Mechanics" from 1995 to 2000, part-time "program monitor" for the Swiss National Science Foundation (member of its Research Council) from 1997 to 2006 and a member of the EUROMECH Council. He is currently an Associate Editor of "Physics of Fluids", a member of the IUTAM general assembly and a member of the schoolwide EPFL Academic Promotions Committee.