



THE UNIVERSITY OF
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Mechanical Engineering

SEMINAR SERIES 2008

Dr Nicholas Hutchins

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Department of Mechanical Engineering
The University of Melbourne

Friday 17th October, 10.30am

Theatre C1, Level 4, Civil Engineering, Block C,
Bldg 174

The existence of very-large scale motions in wall-bounded turbulent flows: Implications to flow control.

A brief overview of recent advances in wall-bounded turbulent flows will be given. Turbulent skin friction arising from these flows accounts for a large fraction of the energy expenditure and emissions occurring in commercial aviation and shipping. There is an obvious need for research that aims to mitigate the drag penalty due to these flows. In considering the current state of skin friction reduction strategies, this talk will argue that there is a need for further study of high Reynolds number turbulent boundary layers in order to produce workable control strategies. Recent experiments in high Reynolds number wall-bounded turbulent flows have revealed the growing influence of a new class of very large-scale motions. Such motions are not apparent in low Reynolds number measurements. This regime of very long vortical motions appear to be universal features of all wall-bounded turbulent flows, and crucially are observed to modulate the instantaneous skin friction at the wall. As Reynolds number increases, not only is there an increase in scale-separation between these large-scale motions and the near-wall cycle, but also an increase in the overall energy of these long meandering features as compared to the viscous scales. This would seem to imply that these features will play an increasingly dominant role in high Reynolds number wall-bounded turbulent flows and an increasingly important role in any successful drag reduction strategy.

MORE INFORMATION

For more Mechanical Engineering seminar information contact:

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