

EPSRC Symposium Challenges in Scientific Computing
Workshop on
Computational Fluid Dynamics
1-3 September 2009, Warwick Mathematics Research Centre
University of Warwick

Introduction

The aim of this workshop has been to facilitate communications between researchers working in large-scale computations of geophysical, industrial, and hydrodynamic stability computations. The unifying theme of this workshop is large-scale computations of boundary layer flows. A common problem to many aeronautic and atmospheric simulations is how to couple the physics of thin boundary layers to large-scale flows. In the aeronautic context it is the curvature of the aerofoil and three-dimensional structure of the body that underlie the problem. The focus of the atmospheric flows for this workshop was on cloud-resolving scales that are accessible to large-eddy simulations. In this context there is coupling to stratification, convection, local rotation and cloud microphysics, as well as to the larger synoptic scales. The final topic was how to efficiently compute, quantify and understand the sensitivity of boundary layers and separated flows to small perturbations.

Scientific Content

This workshop addressed broadly the topic of numerical computations of boundary layers. Within this broad theme three focus areas of active research were considered in depth: industrial flows, atmospheric boundary layers, and boundary layer transition. The computational methods discussed spanned a large range of scales and techniques, from DNS of boundary layers employing billions of grid points to very large scale LES simulations of jet engines and other industrial flows and flows in urban environments. Talks addressed questions that are fundamental, such as the log law, and practical, such as boundary layer control.

Workshop

Talks took place over 3 days and consisted of 17 lectures: 14 one-hour lectures and 3 short presentations. A final half day was left for remaining discussions. All talks were of high quality. Questions were encouraged throughout the talks, leading to a more free-flowing format which allowed researchers from different communities to interact. There was additional lively discussion and interactions during the breaks.

Participation

The workshop was attended by 28 scientists including researchers from the UK, Ireland, France, Italy, Sweden, Poland. and the Netherlands.

Dissemination

Lecture slides are published on the website of the conference:

http://www2.warwick.ac.uk/fac/sci/math/research/events/2008_2009/symposium/wks4