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Summary

We held a symposium, in which questions arising from the interaction of fluid dynamics, applied mathematics and dynamical systems theory in the environment, in flows relevant to aircraft and in model flows, were addressed.

This was a relatively small symposium, of fewer than 50 people, so that active and informal discussion could take place. We intended to publish these discussions with the proceedings.

The Symposium was entitled Fluid Mechanics and the Environment: Dynamical Approaches. There were twenty-three invited papers, and only two posters.

The Symposium was held at the Statler Hotel complex on the Cornell Campus, in the J. Willard Marriott Executive Education Center. It was held on August 23, 24, 1999.

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Office of Naval Research
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A Symposium:

Fluid Mechanics and the Environment: Dynamical Approaches

to

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by

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July 10, 2000

Summary

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Program

H. Aref (University of Illinois at Urbana-Champaign). Simple models of the dynamics of strong vortices in the atmosphere and oceans.

D. A. Caughey (Cornell University). Implicit multi-grid computation of unsteady flows with applications to aeroelasticity.

A. D. D. Craik (University of St Andrews, Scotland). Second-harmonic resonance with parametric forcing and damping: coupled pendula and Faraday waves.

D. Farmer (Institute of Ocean Sciences, Canada). Bubbles and Langmuir circulation.

J. Fernando (Arizona State University). Mixing and Dispersion in Complex Terrain Airsheds.

J. Guckenheimer (Cornell University). Computing Periodic Orbits of Dynamical Systems and their Bifurcations.

P. J. Holmes & T. Smith (Princeton University). Low dimensional models with varying parameters: a model problem and flow through a diffuser with variable angle.

J. C. R. Hunt (Cambridge University, England). Vortical layers and shear sheltering in environmental flows.

D. D. Joseph (University of Minnesota). Modeling of lift forces in fluidized suspensions guided by direct simulation.

A. Kribus (Weizmann Institute, Israel). Radiative transport in complex anisotropic media.

S. Lele (Stanford University). Wake-Vortex Pollution.

J. L. Lumley, D. Rempfer, P. Blossey & L. Parsons (Cornell University). Low-dimensional dynamical model of a turbulent boundary layer over a compliant surface: preliminary results.

A. Mahalov (Arizona State University). Theoretical and Numerical Issues of Pancake Dynamics and Turbulence in the Middle Atmosphere

P. Marcus (University of California at Berkeley). Turbulent Bursts in Couette--taylor and other Flows.

J. McWilliams (University of California at Los Angeles). Surface wave effects on ocean currents [and atmospheric winds].

K. Melville & F. Veron (University of California at San Diego). The Stability of Wind-Driven Water Surfaces: Langmuir Circulations and other Coherent Structures.

I. M. Moroz (Oxford University, England). Bifurcations and synchronicity in low order models of the Faraday disk dynamo

S. Pope (Cornell University). Some Fundamental Issues in Large-Eddy Simulation of Turbulent Flows.

J. Smith (University of California at San Diego). Interactions of Theory and Observation: a story of mixing.

P. Steen Cornell University). Bubble disconnection: self-similarity and cascading physics.

A. Szeri (University of California at Berkeley). Surfactant scavenging by microbubble clouds: consequences for capillary wave damping.

Z. Warhaft and X. Shen (Cornell University). Is small scale turbulence isotropic?

C. H. K. Williamson (Cornell University). Wing wake vortices and temporal vortex pair instabilities.

Publication

An agreement was reached with Professor Beiglboeck of Springer Verlag, Heidelberg, to publish the proceedings of the Symposium in a hard-cover volume in the new Series M: Monographs, under Lecture Notes in Physics. Lumley has undertaken to have the Symposium papers anonymously refereed (by two referees each). Springer reserves the right to reject any paper that does not meet their standards.

The refereeing is complete. All papers were accepted, and revised papers have been received from all but two of the participants. One of these has been delayed by ill health. We are applying as much pressure as possible to the other, and if he does not provide us with a revised manuscript soon, we will proceed without him.

During the Symposium, questions and comments from the audience, and the responses of the speakers, were recorded using the microphones available at each guest place. We intended to transcribe and edit this recorded commentary for publication in the symposium volume.

In the event, the commentary was rather fragmentary and unenlightening. The recording was difficult to understand. We are still making an attempt to transcribe and edit it. However, we may abandon this effort if the quality of the result cannot be made consistent with the whole. The ultimate limitation is the quality of the commentary, which left a great deal to be desired.

Support

Partial support was received from the Office of Naval research, and from the National Science Foundation, Programs in Fluid Dynamics and Hydraulics, Computational math and Physical Meteorology.