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Large eddy simulation of transition of free convection flow over an inclined upward facing heated plate

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Transition of free convection flow of air over a heated surface is investigated numerically by using a Large Eddy Simulation method. Particularly, we focus on how the transition is affected by the inclination angle of the heated plate facing upward. Special attention is paid to the development of the thermal boundary layer and its process of transition from the laminar to turbulent stages. The results show that the transition occurs early when the plate is moved from its vertical position due to the rapid growth of both the velocity and thermal boundary layers. As a consequence, the critical Grashof number drops and the predicted results have very good agreement with various experimental data available in the literature. Shown below preliminary simulation results of the velocity and temperature fields at an inclination angle of 45°.

Biography

Manosh C. Paul is a Lecturer in Thermo fluids and member of the CFD Group of Systems, Power & Energy (SPE) Research Division within the School of Engineering of the University of Glasgow. He gained his Ph.D. in Fluid Mechanics in 2002 from the University of Bath. Subsequently, he moved to the Imperial College London and worked in the Department of Mechanical Engineering as a Research Associate until August 2003. He has first class degrees with distinctions and gold medals in both BSc honours (Mathematics) and MSc (Applied Mathematics) obtained from the University of Dhaka in 1997 and 1999 respectively. His current research is interdisciplinary and focuses on a wide range of topics within the field of Energy, Bioengineering, Thermo fluids and Combustion. He is an author/co-author of over 70 peer-reviewed journal/conference papers, 2 invited book chapters, and 1 edited book; and has been recognised internationally with a number of invited talks, committee member and chair in international conferences. He is a member of the Editorial Board of the Journal of Mechanical Engineering Science (Part C of IMechE, UK), Open Journal of Physical Chemistry (OJPC) USA, Journal of Applied Mechanical Engineering and Journal of Fluids and Thermal Sciences. He has been a consultant for several industries and external Ph.D. examiner in other UK Universities.

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