

Preface

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This special issue presents seven selected papers that were presented at the First International Conference on Computational Methods for Thermal Problems (Therma-Comp 2009) in Napoli, Italy, September 8-10, 2009. It represents the spirit of this new series of conferences, i.e., to bring together researchers interested in fundamental research on numerical methods for heat and fluid flow and those who use such methods to analyse applications where heat and fluid flow phenomena play an important role.

The first paper, by R. Vertnik and B. Šarler, presents a novel application of the meshless Local Radial Basis Function Collocation Method to the solution of incompressible, turbulent, combined forced and natural convection. The authors discuss in details the proposed numerical procedure and compare their numerical results for a mixed convection problem with direct numerical simulation data given from the literature.

The second paper, by A. Andreozzi, N. Bianco and V. Naso, describes a numerical analysis for the effect of radiative heat transfer on mixed convection in a uniformly heated convergent vertical channel. The authors investigate the interaction between buoyancy flow in the channel and an unheated plate sliding at its centre, and study the effect of radiation on the channel Nusselt number.

The third paper, by G. Xie and B. Sunden, presents the simulation of three-dimensional turbulent flow and convective heat transfer over pin-finned tips in rectangular two-pass channels that are encountered in turbine blades. The paper investigates the effect of pin material on the enhancement of heat transfer over pin-finned tips.

The fourth paper, by F. Bozza, D. Siano and M. Costa presents a combined procedure for the quasi-dimensional modelling of heat transfer, combustion, knock phenomena and cyclic variability in a spark ignition turbocharged engine. The work is finalised to the optimal choice of the spark advance that guarantees a knock free engine operation.

In the fifth paper, P. Ciambelli, M. G. Meo, P. Russo and S. Vaccaro, study the effect of different radiation models on the numerical simulation of tunnel fires, both by

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comparing the numerical data obtained for small-scale tunnel fires with experimental results and by simulating full scale fires.

In the sixth paper, E. Tombarević and I. Vušanović numerically solve solidification and melting phenomena in ice-water systems under different temperature conditions. The results are obtained for a horizontal cylindrical annulus using a modified enthalpy method and they show a good qualitative agreement with the available experimental and other numerical results.

The last paper, by V. Grazioso, C. Scalo, G. de Felice and C. Meola, presents an original high level algebraic language-based code for the solution of the Navier-Stokes equations in three dimension with a new scheme for treatment of the advection terms. Other than laminar flow inside a complex geometry, the authors also present the results of a three-dimensional methane-air flame using libraries based on the flamelet model.

We would like to thank all the authors for accepting our invitation to publish their interesting contributions in this special issue.

We would also like to thank Professor Shu Chang for allowing us to edit this ThermaComp2009 special issue of the journal.

Guest editor: Nicola Massarotti, Università degli Studi di Napoli "Parthenope" and Perumal Nithiarasu Swansea University.