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Preface

Papers published in this special issue (and the papers of already published special issue CAMES 2/2013) have been presented during the **Numerical Heat Transfer 2012 International Conference** (**NHT2012**).

This issue starts with a contribution by E. Oñate, J. Marti, P. Ryzhakov, R. Rossi and S.R. Idelsohn entitled "Analysis of the melting, burning and flame spread of polymers with the particle finite element method". This work was presented by Prof. E. Oñate as the plenary keynote lecture. The authors discuss in their paper fundamentals of the particle finite element method together with computational aspects of this technique. They present also application of this technique to model flame spread of burning polymer. Considered process includes melting and collapse of the initial structure.

The next paper in this issue focuses on use of the inverse thermal modelling to determine the heat conductivity of anisotropic material. Namely, W. Adamczyk applies computational fluid dynamic (CFD) modelling to estimate heat losses due to radiation and convection. Then, the influence of omitting the radiative and convective heat transfer on the predicted temperature field and calculated thermal conductivities is discussed in detail. Finally, evaluated numerical results are compared against results of experiment carried out using a specially developed stand.

T. Bury in his work entitled "Coupling of CFD and lumped parameter codes for thermal-hydraulics simulations of reactor containment" is discussing effectiveness of combining results of two types of computer codes in analysis of a pressurized water reactor containment response to accidents caused by a rupture of primary circuit. The assessment of each method has been done by comparing the computational results with experimental data obtained from testing rig of the AP-600 reactor containment cooling system. Additional simulations of a loss-of-coolant accident have been carried out as well, and compared with outcomes of the AP-600 reactor simulator.

The fourth contribution comes from S. Gerace, E. Erhart, A. Kassab and E. Divo who present the application of the meshless method to solve practical large-scale industrial problems. After presenting fundamentals of the model integrated localised meshless solver authors present two numerical examples containing straight film cooling geometry in a rectangular channel with three angle cooling jets as well as normal shock nozzle. In both complex geometries authors were able to create points fully automatically (using their novel model generation process) and produce good quality numerical results.

In the next paper, M. Jaszczur and T. Śliwa discuss the long-term (up to 10 years) exploitation of the borehole heat exchanger system which is a ground source of the heat pump. Authors examine not only heat conduction within ground but also the effect of additional power consumption due to variation of soil properties, the underground water flow and phase change. Authors' simulations demonstrate that thermal power or energy extracted from the soil is fairly sensitive to the type of soil formation. Formation with larger thermal conductivity and larger thermal diffusivity results in higher power and greater energy extraction.

The last paper in this issue is co-authored by M. Rojczyk and I. Szczygieł and presents results of computational modelling of the heat transfer phenomena occurring between a newborn placed in a radiant warmer and the surrounding environment. The analysis, carried out using commercial code ANSYS Workbench – ANSYS Fluent, involves the fluid flow, convection and radiation heat

transfer as well as turbulence modelling. Authors skipped examination of moisture influence on considered processes. The obtained result of modelling are partially validated experimentally.

I am indebted to all authors for their contributions to this special issue, for their cooperation and support. I would also like to express my appreciation to Mr B. Lempkowski, CAMES Editorial Coordinator, for highly professional help I got. I do hope that this issue, together with the accompanying CAMES 2/2013 one, provides a window on the current interests in numerical heat transfer, documenting at the same time recent advances in this fascinating research area.

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