Computer Assisted Methods in Engineering and Science, **22**: 303, 2015.

Preface

This special issue of the *Computer Assisted Methods in Engineering and Science* and the papers in the already published special issue CAMES 3/2015 comprise selected papers presented during the **Eurotherm Seminar No 109** – **Numerical Heat Transfer 2015**. This conference was organised under the auspices of the **EUROTHERM Committee** on 27–30 September, 2015 in Warsaw, Poland. The aim of the EUROTHERM Committee is to promote and foster European cooperation in thermal sciences and heat transfer by gathering together scientists and engineers working in specialised areas.

This issue starts with a contribution by P. Buliński, Z. Ostrowski, W. Adamczyk, A. Fityka and Andrzej J. Nowak entitled "Validation of a numerical model of locally cooled tissues". Their paper deals with the analysis of two stages of the heat transfer process: a mild skin cooling by a brass compress and then skin rewarming to a normal temperature. Measurements of the temperature distribution on the skin and the heat flux between metal and tissues are used as input in the diagnostic tools and methods of skin lesions, with special attention paid to identifying malignant melanoma. Those measurements are combined with numerical simulation.

The next paper in this issue comes from M. Dudek, M. Jaszczur, Z. Kolenda and I. Polepszyc and focuses on "Thermodynamic modeling of high-temperature combined cycle for hydrogen and electricity co-production". The cycle presented in this paper is combined with high- and/or very-high temperature nuclear reactor and consists of three subsidiary circuits with gas turbine and two steam turbines for electric energy generation, and two heat exchangers for hydrogen production at high or medium temperature. The obtained results demonstrate a significant increase of thermal efficiency in comparison to classical solutions.

B. Gambin, E. Kruglenko, A.A. Gałka and R. Wojnar in their work entitled "Macroscopic thermal properties of quasi-linear cellular medium on example of the liver tissue" are applying the homogenised heat conductivity coefficient to numerical simulation of the temperature diffusion produced by ultrasonic pulses. They also deal with heat propagation in a nonlinear medium, present a numerical simulation of the thermal effects of ultrasonic pulses and interpret the simulation results.

The fourth contribution comes from O. Nowakowska and Z. Buliński who present the results of their research in a paper titled "Mathematical modelling of heat transport in a section of human forearm". The authors analyse three geometrical models: a model containing continuous muscle tissue only, a model in which muscle tissue and bones are considered, and a model which contains muscle tissue, bones and main blood vessels. Results obtained with all three models are compared with each other to show the influence of the main blood vessels on the temperature distribution in a forearm.

In the next paper titled "Inverse heat transfer problems: an application to bioheat transfer" M. Rojczyk, H.R.B. Orlande, M.J. Colaço, I. Szczygieł, A.J. Nowak, R.A. Białecki and Z. Ostrowski discuss the application of the Markov chain Monte Carlo (MCMC) method for the estimation of parameters appearing in the Pennes bioheat transfer equation. A one-dimensional test case is used to explore the capabilities of the MCMC method in bioheat transfer problems, specifically for the detection of skin tumours by using surface temperature measurements.

The last paper in this issue is co-authored by A. Wachowicz-Pyzik, L. Pająk, B. Papiernik and M. Michna presents "The application of numerical modeling to geothermal investment". Computer software programs such as Visual MODFLOW, TOUGH, FEFLOW or Petrel, which are commonly used in the development of static and dynamic models, are discussed and compared. Environmental, financial and technical assessments based on mathematical models of surface installation, together with the most important reservoir parameters that influence the utilization of geothermal energy, are also examined.

I am indebted to all the authors for their contributions to this special issue, and for their cooperation and support. I would also like to express my appreciation to Mr. B. Lempkowski, CAMES Editorial Coordinator and his co-workers for their highly professional help. I do hope that this issue, together with the accompanying issue of CAMES 3/2015, 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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