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International conference on boundary element and meshless techniques XVII

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EDITORIAL

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1. Preface

The XVII International Conference on Boundary Element and Meshless Techniques held in Ankara, Turkey, 11–13 July 2016 is devoted to gather the research community who is involved in theoretical advances and innovative applications of both the boundary element method (BEM) and some meshless techniques. This special issue of European Journal of Computational Mechanics constitutes a collection of selected contributions presented at the conference on the theory of BEM and meshless methods, and applications in acoustics, fracture mechanics, magnetohydrodynamics (MHD) and biomathematics.

The paper of Ney A. Dumont and Helvio F. C. Peixoto (Brazil), 'A Fast-Multipole implementation of the simplified hybrid BEM: application to 2D potential problems' presents a novel, kernel-independent, compact fast multipole algorithm which is applicable to curved elements of any order. The proposed fast multipole method is superior to a conventional BEM implementation in terms of computational cost. The implementation for the simplified hybrid BEM is promising since preliminary tests are carried in fracture mechanics with very complicated fundamental solutions.

In the paper, Fast BEM for acoustics with the sparse Cardinal Sine decomposition, Matthieu Aussal, Francois Alouges, Emile Parolin (France) use a newly proposed method for fast numerical convolution in the context of integral equations within BEM based on sparse Cardinal Sine decomposition implementation for solving acoustic problems with the boundary element method coupled with finite element techniques. The performance of the method is illustrated by the computation of the acoustic target strength of a realistic submarine.

The paper on Magnetohydrodynamic pipe flow in annular-like domains by Canan Bozkaya and M. Tezer-Sezgin (Turkey) studies both the BEM and the extended domain–eigenfunction (EDEM) method to simulate the velocity and the induced magnetic field behaviours of an electrically conducting fluid in a pipe under the effect of a magnetic field. It is shown that, the EDEM is computationally less expensive and faster than BEM for moderate values of Hartmann number (Ha). On the other hand, the BEM is more effective and accurate than EDEM for large values of Ha.

The contribution by Antoine Sellier (France), called Fundamental MHD creeping flow bounded by a motionless plane solid wall aims to built 3D fundamental MHD Stokes flow produced by a source point in a conducting Newtonian liquid bounded by a plane solid and motionless wall in the presence of a magnetic field. For the cases of insulating and perfectly conducting plane wall using the solution in the free space, a 3D auxiliary MHD Stokes flow regular in the entire liquid domain is determined for a unit force.

In the article, DRBEM solution of the acid-mediated tumour invasion model with time-dependent carrying capacities by Gülnihal Meral (Turkey), a numerical method (BEM for

the space-FDM for the time) is given for an acid-mediated tumour cell invasion model consisting of a system of non-linear reaction–diffusion equations for the density of cancer and normal cells and for the acid concentration. The application of the method to the model system shows that the aggressivity parameter which is proportional to the death rate of normal cells due to excess of protons is large when the tumour invades more space, which is consistent with the experimental findings.

As Guest Editors, we would like to express our appreciation to the International Scientific Advisory Committee for their assistance in supporting and promoting the objectives of the conference and for their assistance in the revision of the submitted papers. We are very thankful to the European Journal of Computational Mechanics, its Editor-in-chief, Prof. Hamid Bahai, the editorial stuff and the Managing Editor of Taylor & Francis Group, Richard Goodman, for having given us the opportunity of hosting this special issue.

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