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Guest Editorial

This special issue of the *Journal for Computational Methods in Engineering Science and Mechanics* contains six selected papers in computational mechanics from participants of the ESGI meeting and its embedded workshop that took place in Denmark. For the first time, it took place in the Sønderborg area, in a close proximity to one of the campuses of the University of Southern Denmark. The meeting was attended by 65 participant from the UK, Norway, Italy, Czech Republic, Turkey, China, Germany, Latvia, Canada, the United States, Finland, and Denmark.

The issue is opened by an invited survey paper on multi-scale modelling of nonlinear elastomers by H.T. Banks, N.G. Medhin, and G.A. Pinter. The paper has resulted from an extended project between applied mathematicians in the Center for Research in Scientific Computation at North Carolina State University in the USA and the Thomas Lord Research Center of the Lord Corporation. The authors give a comprehensive overview of experimental, modelling, computational and theoretical efforts focusing on the nonlinear and hysteretic aspects of dynamic deformations.

Multi-physics problems are discussed in the invited paper by M. Cross et al. The paper provides an overview of the developing needs for simulation software technologies for the computational modelling of problems that involve interactions amongst varying physical phenomena over a variety of time and space scales. The authors point out that in many cases the resulting multi-physics and multi-scale computations are very compute intensive and the simulation software must operate effectively in parallel. The authors describe an approach to these classes of multi-disciplinary simulation in parallel, with a number of key examples of application to important engineering problems.

The other four papers deal with numerical methods and computational algorithms to solve compressible flows, shallow-water free-surface flows, reactive advection-dispersion problems and the diffusion flame combustion of a fuel droplet.

We hope that this special issue on "Methods of Computational Mechanics for Industry, Science, and Technology" will stimulate further progress in industrial applied mathematics and mechanics based on collaborative efforts among scientists, mathematicians, industrialists, and engineers.

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