Preface

Special Issue on Computing in Engineering Applications

The scope of this special issue covers progresses in computing technologies with applications in structural engineering and materials. The issue contains nine articles addressing various approaches including numerical schemes like finite element method on the analysis of structures and other related problems.

Chen and her co-authors adopt the inhomogeneous field gel theory to mimic the formation patterns of the growing of natural fruits and drying of leaves via the swelling and de-swelling of gel materials. These natural processes are simulated via ABAQUS finite element program. Nelson Lam and his co-workers introduce practical methods for estimating the amount of contact force that can be generated by the impact of a fallen debris object with the governing principles. An experimental-calibration procedure as part of the assessment process has been verified as presented in the second article. Liu and his colleagues investigate the performance of designed composite materials and the effects of the uniformly distributed gel inclusions on composite materials. The mechanical behavior of the composite gel periodic structure with various gel inclusions is studied via numerical simulations.

Three-dimensional nonlinear finite element analyses of nuclear power plant containment structures considering thermal effects have been carried out by Kwak and Kwon in the fourth paper. Through the differences in the structural behavior of containment structures due to the inclusion of temperature loading, the importance of elevated temperature effect on the ultimate resisting capacity of PCCV has been emphasized. The next article involves experimental study on creep and shrinkage of high-performance ultra-lightweight cement composite of 60MPa reported by Zhang and her colleagues. Wang and his co-authors examine the application of the maximum a posteriori estimates of the distribution parameters for the story stiffness of a building and a surrogate model is developed and applied to facilitate the nonlinear response computation when studying the fragilities of the hysteretic shear frame.

Wang and his colleagues propose the second generation wavelet (SGW)-based multivariable finite element (MFEM) equations for static and vibration analyses of beam based on the generalized variational principles. The method combines the advantages of high approximation performance of the SGW method and the independent solution of field functions of the MFEM. Bouziane and his co-authors adopt a special mixed finite element associated with the virtual crack extension technique to evaluate the energy release rate for kinking cracks. Examples with kinking cracks in a homogeneous material and bi-material are presented to demonstrate computational accuracy of the method. Finally, Wang and his co-workers carries out the probabilistic buckling analyses of micro-films with geometrical and physical parametric uncertainty but deterministic film parameters. The results illustrate the probabilistic relation between buckling deformation and uncertain parameters.

In summary, this special issue is devoted to various recent developments applicable to solve problems encountered in Structural Engineering and Materials. The contributions contained in this issue provide and demonstrate how certain natural phenomena be efficiently simulated and studied. The quest editors would like to express their sincere thanks to the contributors of the articles, the referees who reviewed the manuscripts and provided constructive comments which

have improved significantly the quality of the presentations. We are also grateful to the chief editor and the publisher of Structural Engineering and Mechanics who have invited us to serve as guest editors of this special issue. They have facilitated our endeavor to produce this special issue and made our editing work an easy and pleasant task.

Guest Editor
Somsak Swaddiwudhipong
National University of Singapore, Singapore

Co-Guest Editors
Nelson Lam
University of Melbourne, Australia

Zishun Liu
Xi'an Jiaotong University, China