



**Journal of
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PREFACE

Adair R. Aguiar

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PREFACE

The Eleventh Pan-American Congress of Applied Mechanics (PACAM XI) was held in Foz do Iguaçu, Paraná, Brazil, from January 4 to 8, 2010. The aim of the congress series, set forth by the American Academy of Mechanics (AAM), is to promote progress in the broad field of mechanics by exposing engineers, scientists, and advanced graduate students to new research developments, methods, and problems in mechanics, and by providing broad opportunities for personal interactions through formal presentations and informal conversations.

The PACAM series is held every two years, always in a Latin American venue, at a time when few other conferences are scheduled. Previous congresses had been held in Rio de Janeiro, Brazil (1989), Valparaiso, Chile (1991), São Paulo, Brazil (1993), Buenos Aires, Argentina (1995), San Juan, Puerto Rico (1997), Rio de Janeiro, Brazil (1999), Temuco, Chile (2002), Havana, Cuba (2004), Mérida, Mexico (2006), and Cancún, Mexico (2008).

PACAM XI was a cross-disciplinary congress that attracted 230 researchers from thirty countries of the three Americas, Europe, Africa, and Asia. They have presented 202 regular papers and 14 invited lectures in the areas of solid mechanics, fluid mechanics, dynamics, controls, computational mechanics, composite materials, biomechanics, structural reliability and stochastic mechanics, nonlinear phenomena in mechanics, non-Newtonian fluid mechanics, fatigue and fracture mechanics, and other areas of general interest. Also, the Society for Natural Philosophy (SNP) held its 48th meeting during the event. The online version of the Proceedings of PACAM XI can be downloaded from the congress web site at <http://www.set.eesc.usp.br/pacam2010>.

PACAM XI was promoted by AAM, SNP, the Brazilian Society of Mechanical Sciences and Engineering (ABCM), and the Brazilian Society for Applied and Computational Mathematics (SBMAC). A sincere acknowledgment is extended to all the sponsors, which include the Itaipu Technological Park, Itaipu Binacional, ENGEMASA, Brazilian Ministry of Science and Technology, Coordination for the Improvement of Higher Education Personnel (CAPES), The National Council for Scientific and Technological Development (CNPq), and several sectors from the University of São Paulo (USP).

Following a PACAM tradition, authors of selected talks were invited to submit full-length papers related to their presentation at the conference. The selected papers were then subjected to the normal, peer-review process, and the best papers were included in this special issue of the *Journal of Mechanics of Materials and Structures*. I thank the Editors-in-Chief for the opportunity to organize the special issue; the individual authors for their excellent contributions; and the reviewers who not only helped in the selection of the best papers but also used skillful judgment to find merit and to make corrections for the betterment of the selected papers.

A total of 14 papers were selected from a wide range of topics in theoretical, computational, and experimental mechanics, and represent well the areas and mini-symposia of PACAM XI:

In solid mechanics, Nogueira de Codes and Benallal present experimental results about the effects of specimen geometry in the characteristics of Portevin–le Châtelier effect due to dynamic strain aging of an aluminum alloy. Otero and coauthors present analytical results about the dispersion relations for SH waves on a magnetoelastic heterostructure with imperfect interfaces.

In fluid mechanics, Huang and Houchens present a numerical linear stability analysis of a thermocapillary driven liquid bridge with magnetic stabilization. In particular, they present numerical issues that commonly arise when using spectral collocation methods and linear stability analyses in the solution of the associated partial differential equations. Cruz and coauthors conduct a numerical investigation of director orientation and flow of nematic liquid crystals.

In dynamics, Lenci and Marcheggiani investigate the problem of lateral vibrations of footbridges due to the synchronization of the pedestrian's motion with that of the supporting structure by means of a three-dimensional discrete time model. Zhang and Yu use a finite element method combined with the floating frame formulation to investigate vibration of a simulation nuclear fuel bundle structure confined in a circular tube. Orlando and coauthors analyze the influence of geometric imperfections on the nonlinear behavior and stability of Augusti's model under static and dynamic loads. Finally, Mazzilli and Sanches use a nonlinear normal mode approach for the active control of vortex-induced vibrations in offshore catenary risers, which are used in deepwater oil and gas exploitation.

In composites, Shindo and coauthors examine theoretically and experimentally the nonlinear electromechanical response of piezoelectric macrofiber composite. In computational mechanics, Larrosa and coauthors present a three-dimensional implementation of the energy domain integral (EDI) for the analysis of interface cracks in transversely isotropic bimetals.

In biomechanics, Ehret and coauthors present a technique to prepare thin samples of planar or bulky soft tissue with very accurate geometry and apply it to porcine dermal tissues. They obtain experimental results that are well represented by a constitutive model that accounts for the elastic and dissipative behavior of soft tissues.

In stochastic mechanics, Sampaio and Bellizzi explore the main properties of the smooth Karhunen–Loève decomposition for nonstationary random processes. At the interface of computational and stochastic mechanics, Lepage and coauthors study the influence on the macroscopic (homogenized) elastic properties of polycrystalline materials induced by uncertainties on the material texture and microstructure geometry. To perform this analysis, the perturbation stochastic finite element method is coupled to the mathematical theory of homogenization that leads to a second-order perturbation-based homogenization method. Also, Evangelatos and Spanos present a collocation approach for spatial discretization of stochastic peridynamics modeling of fracture.

Finally, I would like to express my deep gratitude to all colleagues and staff at USP who helped me in the several stages of the PACAM XI organization. I am also indebted to my wife Rogéria, my son Tiago, and my daughter Helena, who not only helped in the organization, but also were very patient and understanding. To them, all my love and appreciation.

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