Special issue on “Recent Advances on the Mechanics of Materials”

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This special issue of *Meccanica* collects scientific contributions presented at the VIII Meeting of the Mechanics of Materials Group (GMA), a branch of the Italian Association of Theoretical and Applied Mechanics (AIMETA). As inaugurated with the analogous conference in 2014, the GMA Meeting has been organized together with the Italian Congress of Computational Mechanics (GIMC), resulting in the GIMC-GMA 2016 congress, held in the IMT School for Advanced Studies of Lucca, Italy, from the 27th to the 29th of June 2016 [1].

This conference was organized in two parallel sessions, respectively hosting the GMA and the GIMC, and offering, overall, 87 regular presentations along with two invited plenary lectures, delivered by

Prof. Vikram Deshpande (University of Cambridge) on statistical mechanics of single cells and by Prof. Ferdinando Auricchio (University of Pavia) on additive manufacturing.

The GMA meeting was animated by 45 lectures grouped within three sessions, a general one titled “Mechanics and Materials” along with two thematic sessions. The two thematic sessions focused on multiphysics characterization and modeling of biological tissues and biomaterials (organized by P. Vena, M. Marino, M. Conti, L. Cristofolini and D. Gallo) and on modeling of microstructured materials and metamaterials (organized by A. Bacigalupo, F. Dal Corso and M.L. De Bellis).

The 10 original articles collected in this Special Issue provide a wide overview on recent advances on the Mechanics of Materials, including homogenization approaches for composites, non-local modeling, biomechanics and biomimetics. Delving into the content of the Special Issue, A. DeSimone investigates the occurrence of spontaneous bending of pre-stretched bilayers using a two-dimensional nonlinear plate model for thin sheets of nematic elastomers derived through a dimensional reduction based on Gamma-convergence, with potential applications to the design of innovative biomimetic devices. R. Springhetti and N.S. Selyutina focus on a relevant topic for the mechanics of biological tissues, that is the viscoelastic modeling of articular cartilages under impact loading. Three articles,

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authored by G. Lancioni and V. Corinaldesi; H. Darban and R. Massabò; F. Freddi, E. Sacco and R. Serpieri, propose advanced mathematical models and numerical strategies to tackle the problem of damage and nonlinear mechanical response in composite materials and structures. Original contributions in the homogenization theory for media with periodic structure are provided in the studies by Al. Genoese, An. Genoese, N.L. Rizzi and G. Salerno, on the in-plane elastic constants of monolayer diatomic sheets with hexagonal nanostructure, and by M. Lepidi and A. Bacigalupo, on wave propagation in lattice materials with reference to the influence of small changes in the periodic structure. A.A. Pisano and P. Fuschi put forward an approach to efficiently deal with symmetric boundary value problems in non-local elasticity, with emphasis on the appropriate boundary conditions. L. Lanzoni, E. Radi and A. Nobili provide a detailed characterization of the stress field around wellbores in poroelastic media. L. Freddi, P. Hornung, M.G. Mora and R. Paroni propose a rigorous theoretical derivation of one-dimensional von Kármán models for elastic ribbons.

It has been a pleasure to work with editorial team at Springer and, in particular, with Prof. Luigi Gambarotta, Editor-in-Chief of *Meccanica*, who deserves our gratitude for giving us the opportunity to

contribute to *Meccanica* with this Special Issue. We are indebted to the reviewers for their fundamental work in the peer-review process to assure the highest possible quality of the publications. We are also pleased to thank all the participants to the GIMC-GMA 2016 congress for their contributions and discussions.

This Special Issue represents a timely collection inherent the very active research carried out by the Italian scientific community on the Mechanics of Materials. We hope it will be attractive to readers interested in general Mechanics, as well as to those specifically concerned with the Mechanics of Materials, and we trust it will offer a basis for further developments and discussions at the next edition of the GIMC-GMA conference, to take place in Ferrara (Italy) in 2018.

Reference

1. Atti del Convegno GIMC-GMA (2016) In: Paggi M, Bacigalupo A, Bennati S, Borri C, Corrado M, Gizzi A, Valvo PS (eds) XXI Convegno Italiano di Meccanica Computazionale e VIII Riunione del Gruppo Materiali AIMETA, Lucca, 27–29 June 2016, Tipolitografia Contini, Sesto Fiorentino (Florence). ISBN: 9791220013338