

## Preface

This volume of *Technische Mechanik* contains select papers presented at the **5<sup>th</sup> International Conference on Material Modeling (ICMM5)**, which took place June 14-16, 2017 in the Palazzo Argiletum in Rome, Italy.

By all meaningful measures, ICMM5 can be considered as a great success, attracting over 120 participants (ranging from senior colleagues to graduate students) from more than 20 countries, and featuring a technical program that well reflected the state of art in material modeling.

ICMM5 included thematic sessions on the following topics

- Elasticity and viscoelasticity
- Plasticity and viscoplasticity
- Strain gradient and nonclassical approaches
- Atomistic to continuum transitions
- Statistical mechanics
- Micro- and nano-scale modeling of hcp alloys
- Nanomechanics
- Phase and chemically transforming materials
- Multiscale modeling
- Granular materials and particle systems
- Polymeric materials
- Biomaterials
- Multi-field modeling
- Multiferroic materials
- Creep, damage, fracture, and fatigue
- Experimental identification and material characterization
- Micro-architected materials
- Mechanical metamaterials
- Homogenization techniques
- Length and time scales for materials: theory, experiments and simulations

Among them, the sessions on generalized and gradient continua gained most attention.

In particular we see a trend towards the development of mathematical modeling of complexity, which may lead to the innovative design of new metamaterials, and the description of very important phenomena in damage and plasticity. In this aspect multiphase, multiphysics and multiscale materials and structures deserve great interest and seem to represent an important frontier of contemporary research in mechanics and in innovative technology.

The scientific debate has been active and open, all points of view were represented fairly and the chairmen allowed some limited prolongations of the questions times in order to facilitate the scientific exchange.

Scientific, and in general cultural discussion took place also during the social dinner in the cloister of the Argiletum, which represented a magnificent location for such a social and cultural event.

All participants were invited to submit full-length papers to a special issue of *Technische Mechanik*. The contributed papers, representing a cross-section of the conference, were peer-reviewed and appear in this volume.

The next conference in this series will be ICMM6 scheduled for June 26-28, 2019 at the University of Lund, Sweden.

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