Special Issue

Advanced Modeling and Design for Composite Materials and Structures

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Special Issue: Advanced Modeling and Design for Composite Materials and Structures

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Research on composites is by nature interdisciplinary. It involves material science and chemistry for modification of interfaces and development of new polymer systems, which are stronger, tougher, flame retardant, easy to manufacture and inexpensive; principles of mechanics need to be used for the design of composite structures, the evaluation of their mechanical properties, the prediction of damage characteristics, and for the analysis and optimization of manufacturing processes for mitigating defects.

Considering the importance of advanced modelling and simulation in the development of composite materials and structures, this SI was initiated and supported by Prof. Guangyong Sun (Associate Editor), Prof. Peter W.R. Beaumont (Editor for Special Issues) and Prof. Maria Kashtalyan, Editor-in-Chief. The aim of this focused SI is to provide a platform for scientists to share their work and for readers to review the most recent developments in this field. Guest editors for this SI include Assoc. Prof. Yucheng Zhong from Wuhan University of Technology, Dr. Tao Wu from Technische Universität Dresden, Prof. Guangyong Sun

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from Hunan University, Assist. Prof. Aleksandr Cherniaev from University of Windsor and Prof. René Alderliesten from Delft University of Technology.

Manuscripts submitted to this SI were subjected to a rigorous review process and evaluated based on their relevance to this SI, their novelty and scientific contribution. 17 manuscripts are finally included in this SI. We would like to express our gratitude to editors and staff of the Applied Composite Materials for enthusiastically supporting its publication. Special thanks shall be given to authors and reviewers who made great efforts to ensure and maintain the high standard of manuscripts in this collection of selected papers.

Within 17 accepted papers, various interesting issues concerning different composite structures are addressed. Four major themes are covered. The first theme comprises analysis of the mechanical response of composite structures, including strength prediction, damage behavior under high and low velocity impact, torsional performance of complex skin-core composite rods, and shape memory processes of composites. The second theme touches upon AI-assisted modeling, including the prediction of elastic moduli and fatigue life of composites. The third theme addresses manufacturing aspects of composites, including numerical simulation of light-curing, and curing process of additive manufacturing of thermosetting composites. The fourth major theme concerns design of composite structures, specifically including energy-absorbing CFRP tubes and composite leaf springs.

Data Availability Data sets generated during the current study are available from the corresponding author on reasonable request.