

Special issue JTCM on “continuous-discontinuous long fiber-reinforced polymer composite structures”[Editorial]

Thomas Böhlke, Christophe Binetruy, Frank Henning, Andrew Hrymak, Luise Kärger, Loredana Kehr, Kay Weidenmann, Mehrdad N. Ghasemi-Nejhad

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Foreword

Discontinuous long fiber-reinforced polymer composite structures with local continuous fiber reinforcements represent an important class of lightweight materials that offer significant energy-saving potentials due to their high specific stiffness/strength with optimized materials costs. However, integrated and experimentally validated design, analysis, modeling, processing, and characterization concepts for combinations of continuous and discontinuous fiber-reinforced polymer composite structures are challenging and require holistic, interdisciplinary approaches to understand the complex physical materials behavior and the interactions of the polymer matrix with the fiber reinforcements as well as between the composites constituents featuring different fiber architectures. From such studies, methods can be derived and transferred to exploit the potentials of composites based on long and continuous fiber-reinforced thermoplastics (LFTPs) in lightweight constructions through improved process and component design. This special issue collects contributions and recent advancements in research related to continuous-discontinuous long fiber-reinforced thermoplastic polymer composites, which are collectively referred to as LFTPs here.

For such anisotropic and heterogeneous materials, it is essential to assess the materials' properties, behaviors, and performances, especially when considering their applications in real-case/real-world scenarios. Therefore, manuscripts dealing with characterization and experimental testing of LFTPs have been included in this special issue.

Several manuscripts present advanced modeling, simulation, and design/processing approaches since manufacturing processes of LFTPs result in material properties that are heterogeneous, anisotropic, and nonlinear. Additionally, the thermomechanical interaction between the matrix and the reinforcement represents a challenging aspect.

Finally, for the applications of such materials in three-dimensional structures within an industrial context, interdisciplinary scientific methods in the process as well as materials

engineering and product development are needed. The efficient processing of LFTPs as well as the flawless combination of continuous fibers within LFTPs are addressed by several contributions.

Thomas Böhlke¹, Christophe Binetruy², Frank Henning^{3,4}, Andrew Hrymak^{5,6}, Luise Kärger⁷, Loredana Kehrer⁸, Kay Weidenmann⁹ and Mehrdad N Ghasemi-Nejhad¹⁰

¹*Institute of Engineering Mechanics, Continuum Mechanics, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany*

²*Research Institute in Civil Engineering and Mechanics (GeM), Nantes Université, Nantes, France*

³*Fraunhofer Institute for Chemical Technology (ICT), Pfaffenhofen, Germany*

⁴*Institute of Vehicle System Technology, Chair of Light-Weight Technology, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany*

⁵*Department of Chemical and Biochemical Engineering, Western University, London, ON, Canada*

⁶*Fraunhofer Innovation Platform for Composites Research, London, ON, Canada*

⁷*Institute of Vehicle System Technology, Lightweight Design, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany*

⁸*Institute of Engineering Mechanics, Continuum Mechanics, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany*

⁹*Institute for Materials Resource Management, Chair for Hybrid Composite Materials, University of Augsburg, Augsburg, Germany*

¹⁰*Department of Mechanical Engineering, University of Hawaii at Manoa, Honolulu, HI, USA*