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Finite Element Methods in Smart Materials and Polymers

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Functional polymers show unique physical and chemical properties, which can manifest as dynamic responses to external stimuli such as radiation, temperature, chemical reaction, external force, and magnetic and electric fields. Recent advances in the fabrication techniques have enabled different types of polymer systems to be utilized in a wide range of potential applications in smart structures and systems, including structural health monitoring, anti-vibration, and actuators. The progress in these integrated smart structures requires the implementation of finite element modelling using a multiphysics approach in various computational platforms. This book presents finite element methods applied in modeling of the smart structures and materials with particular emphasis on hydrogels, metamaterials, 3D-printed and anti-vibration constructs, and fibers.

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