



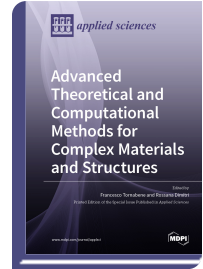
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Advanced Theoretical and Computational Methods for Complex Materials and Structures

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The broad use of composite materials and shell structural members with complex geometries in technologies related to various branches of engineering has gained increased attention from scientists and engineers for the development of even more refined approaches and investigation of their mechanical behavior. It is well known that composite materials are able to provide higher values of strength stiffness, and thermal properties, together with conferring reduced weight, which can affect the mechanical behavior of beams, plates, and shells, in terms of static response, vibrations, and buckling loads. At the same time, enhanced structures made of composite materials can feature internal length scales and non-local behaviors, with great sensitivity to different stacking sequences, ply orientations, agglomeration of nanoparticles, volume fractions of constituents, and porosity levels, among others. In addition to fiber-reinforced composites and laminates, increased attention has been paid in literature to the study of innovative components such as functionally graded materials (FGMs), carbon nanotubes (CNTs), graphene nanoplatelets, and smart constituents. Some examples of smart applications involve large stroke smart actuators, piezoelectric sensors, shape memory alloys, magnetostrictive and electrostrictive materials, as well as auxetic components and angle-tow laminates. The development of advanced theoretical and computational models for composite materials and structures is a subject of active research and this is explored here for different complex systems, including their static, dynamic, and buckling responses; fracture mechanics at different scales; the dynamic, and delamination of materials and interfaces.



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