
Current Challenges in Multiscale Mechanics - From Materials to Structures

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Abstract

Computer simulation-driven characterization and in-silico testing of materials has become a popular strategy in nowadays engineering mechanics and materials science. In many cases, the involved computational methods are of numerical nature. However, if the studied material exhibits some sort of hierarchical organization, with specific organizational patterns discernible on observation scales which are distinctively separated from each other, the aforementioned numerical methods reach (or even exceed) their application limit, due to the then arising enormous computational costs. A well-proven alternative to purely numerical approaches, when dealing with hierarchically organized materials, is multiscale modeling. This technique involves consideration of the physical properties of the constituents of a material on the observation scale where microstructural patterns occur, and establishing physically well-substantiated mechanical rules for scaling the material properties up to an observation scale where the material appears to be quasi-homogeneous (and vice versa). This mini-symposium provides a forum for latest insights and new developments in the diverse field of multiscale modeling, focusing thereby on the mechanical properties of materials. Contributions presenting models ranging from the molecular to the structural scale, and dealing with all kinds of hierarchically organized materials are welcome.

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