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Engineering : Solid Mechanics

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Asymptotical Mechanics of Composites

Modelling Composites without FEM

- Makes it possible to define the most important out of numerous parameters describing composite material systems
- Shows that it is possible to construct efficient computationally oriented models of complex systems by using asymptotic methods
- Includes analyses of composites with non-regular structure and cluster type composite conductivity

In this book the authors show that it is possible to construct efficient computationally oriented models of multi-parameter complex systems by using asymptotic methods, which can, owing to their simplicity, be directly used for controlling processes arising in connection with composite material systems. The book focuses on this asymptotic-modeling-based approach because it allows us to define the most important out of numerous parameters describing the system, or, in other words, the asymptotic methods allow us to estimate the sensitivity of the system parameters. Further, the book addresses the construction of nonlocal and higher-order homogenized models. Local fields on the micro-level and the influence of so-called non-ideal contact between the matrix and inclusions are modeled and investigated. The book then studies composites with non-regular structure and cluster type composite conductivity, and analyzes edge effects in fiber composite materials. Transition of load from a fiber to a matrix for elastic and viscoelastic composites, various types of fiber composite fractures, and buckling of fibers in fiber-reinforced composites is also investigated. Last but not least, the book includes studies on perforated membranes, plates, and shells, as well as the asymptotic modeling of imperfect nonlinear interfaces.

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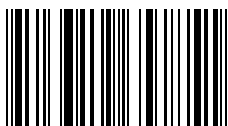
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