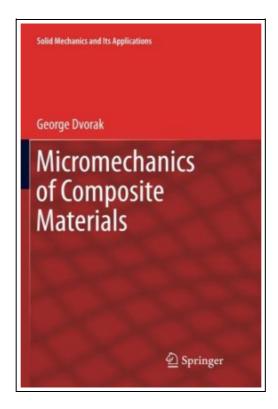
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MICROMECHANICS OF COMPOSITE MATE



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Condition: New. Publisher/Verlag: Springer Netherlands | This book examines analytical and numerical methods for modeling composite materials, laminates, polycrystals and other heterogeneous solids, focused on connections between material properties and responses ranging from nanoscale to micro to macroscale. | This book presents a broad exposition of analytical and numerical methods for modeling composite materials, laminates, polycrystals and other heterogeneous solids, with emphasis on connections between material properties and responses on several length scales, ranging from the nano and microscales to the macroscale. Many new results and methods developed by the author are incorporated into the rich fabric of the subject, which has developed from the work of many researchers over the last 50 years. Among the new results, the book offers an extensive analysis of internal and interface stresses caused by eigenstrains, such as thermal, transformation and inelastic strains in the constituents, which often exceed those caused by mechanical loads, and of inelastic behavior of metal matrix composites. Fiber prestress in laminates, and modeling of functionally graded materials are also analyzed. Furthermore, this book outlines several key subjects on modeling the properties of composites reinforced by particles of various shapes, aligned fibers, symmetric laminated plates and metal matrix composites. This volume is intended for advanced undergraduate and graduate students, researchers and engineers interested and involved in analysis and design of composite structures. | 1 Tensor component and matrix notation.- 2 Anisotropic elastic solids.- 2.1 Elastic strain energy density.- 2.2 Material symmetries.- 2.3 Transversely isotropic composite materials.- 2.4 Cylindrically orthotropic materials.- 2.5 Young's modulus, shear modulus and Poisson's ratio.- 3 Elementary concepts and tools.- 3.1 Aggregates and constituent phases.- 3.2 Herogeneous microstructures.- 3.3 Representative volume.- 3.4 Local and overall stress and strain fields.- 3.5 Overall properties and local fields.- 3.6 Transformation fields.- 3.7 Work, energy and reciprocal theorems.- 3.8 The Levin formula and...



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