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Titolo	Asymptotical Mechanics of Composites [[electronic resource]] : Modelling Composites without FEM // by Igor V. Andrianov, Jan Awrejcewicz, Vladyslav V. Danishevskyy
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Descrizione fisica	1 online resource (XI, 329 p. 139 illus., 7 illus. in color.)
Collana	Advanced Structured Materials, , 1869-8433 ; ; 77
Disciplina	620.11892
Soggetti	Mechanics Mechanics, Applied Materials science Approximation theory Solid Mechanics Characterization and Evaluation of Materials Approximations and Expansions
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references at the end of each chapters.
Nota di contenuto	1 contains a short literature survey and a description of aims of the book and used approaches.- 2 presents a short tutorial, where the employed physical theories, the popular methods of theory of composites and certain mathematical approaches are described.- 3 Devoted to the transport properties of fiber and particle-reinforced composites. Besides of detection of their effective properties, local fields on the micro-level and an influence of the non-ideal contact between the matrix and inclusions are investigated -- 4 Edge effects are also studied.- 5. Besides of detection of the effective properties, the edge effects in fiber composite materials are investigated.- 6 presents the problems aimed at the transition of the load from the fiber to the matrix for elastic and viscoelastic composites, various types of fiber composite fracture, and the buckling phenomena of fibers in fiber-reinforced composites.- 7 is devoted to problems of perforated membranes, plates and shells -- 8 Nonlinear elastic problems are

analyzed.

Sommario/riassunto

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.
