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★**Microstructural randomness and scaling in mechanics of materials.**

CRC Series: Modern Mechanics and Mathematics.
Chapman &Hall/CRC, Boca Raton, FL, 2008. *xxvi*+471 *pp.* $99.95.
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The main purpose of the book is to describe the tools that have been developed for continuum modeling of random microstructures—an issue important in many areas of applied science and engineering. The material is presented in the context of mechanics of random media and is illustrated by a variety of applications. The text is intended primarily to introduce the reader to general ideas of statistical characterization of heterogeneous microstructures and to discuss practical implementation of these ideas, sometimes at the expense of more rigorous considerations.

In the introductory section, the main concepts of a random microstructure, separation of scales, and representative volume element (RVE) are introduced. Then, in Chapter 1, the background material on discrete random processes and stochastic models of microstructures is presented, followed by a discussion of continuous random processes in Chapter 2. Only a brief summary of probability and stochastic processes is given here, with the goal of providing a self-contained description of what is needed to understand the remainder of the text.

The fundamental material on periodic and disordered planar lattice (springs) networks is introduced in Chapters 3 and 4. Here the examples of random network models include those for granular media and fiber networks. In Chapters 5 and 6, the basics of planar and micropolar elasticity are considered, respectively. The selection of topics covers the Principle of Virtual Work, Hamilton's principle, planar Cosserat elasticity, stress-invariance, and the passage of a microstructure to an effective micropolar continuum, among others.

The remainder of the book focuses on problems of microstructural randomness and scaling. It examines both representative and statistical volume elements (RVEs/SVEs) as well as micromechanically based stochastic finite elements (SFEs). The author also studies nonlinear elastic and inelastic materials, the stochastic formulation of thermomechanics with internal variables, and wave propagation in random media.

The first six chapters include problems, making the text suitable for use in a graduate-level course, e.g., on micromechanics, mechanics of random media, or probabilistic mechanics.

Reviewed by *Dmitry Golovaty*