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Altri autori (Persone)	VernescuBogdan
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Soggetti	Homogenization (Differential equations) Mathematical physics
Lingua di pubblicazione	Inglese
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Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Introductory examples of homogenization method. Long waves in a layered elastic medium ; Short waves in a weakly stratified elastic medium ; Dispersion of passive solute in pipe flow ; Typical procedure of homogenization analysis -- Diffusion in a composite. Basic equations for two components in perfect contact ; Effective equation on the macroscale ; Effective boundary condition ; Symmetry and positiveness of effective conductivity ; Laminated composites ; Bounds for effective conductivity ; Hashin-Shtrikman bounds ; Other approximate results for dilute inclusions ; Thermal resistance at the interface ; Laminated composites with thermal resistance ; Bounds for the effective conductivity ; Chemical transport in aggregated soil ; Appendix 2A : heat transfer in a two-slab system -- Seepage in rigid porous media. Equations for seepage flow and Darcy's law ; Uniqueness of the cell boundary-value problem ; Symmetry and positiveness of hydraulic conductivity ; Numerical computation of the permeability tensor ; Seepage of a compressible fluid ; Two-dimensional flow through a three-dimensional matrix ; Porous media with three scales ; Brinkman's modification of Darcy's law ; Effects of weak fluid inertia ; Appendix 3A : spatial averaging theorem -- Dispersion in periodic media or flows. Passive solute in a two-scale seepage flow ; Macrodispersion in a three-scale porous medium ; Dispersion and

transport in a wave boundary layer above the seabed ; Appendix 4A : derivation of convection-dispersion equation ; Appendix 4B : an alternate form of macrodispersion tensor -- Heterogeneous elastic materials. effective equations on the macroscale ; The effective elastic coefficients ; Application to fiber-reinforced composite ; Elastic panels with periodic microstructure ; Variational principles and bounds for the elastic moduli ; Hashin-Shtrikman bounds ; Partially cohesive composites ; Appendix 5A : properties of a tensor of fourth rank -- Deformable porous media. Basic equations for fluid and solid phases ; Scale estimates ; Multiple-scale expansions ; Averaged total momentum of the composite ; Averaged mass conservation of fluid phase ; Averaged fluid momentum ; Time-Harmonic motion ; Properties of the effective coefficients ; Computed elastic coefficients ; Boundary-layer approximation for macroscale problems ; Appendix 6A : properties of the compliance tensor ; Appendix 6B : variational principle for the elastostatic problem in a cell -- Wave propagation in inhomogeneous media. Long wave through a compact cylinder array ; Bragg scattering of short waves by a cylinder array ; Sound propagation in a bubbly liquid ; One-dimensional sound through a weakly random medium ; Weakly nonlinear dispersive waves in a random medium ; Harmonic generation in random media.

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### Sommario/riassunto

In many physical problems several scales present either in space or in time, caused by either inhomogeneity of the medium or complexity of the mechanical process. A fundamental approach is to first construct micro-scale models, and then deduce the macro-scale laws and the constitutive relations by properly averaging over the micro-scale. The perturbation method of multiple scales can be used to derive averaged equations for a much larger scale from considerations of the small scales. In the mechanics of multiscale media, the analytical scheme of upscaling is known as the Theory of Homogenization

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