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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 intertia ;

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.

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 Homogenizati