1.	Record Nr.	UNINA9910822307303321
	Autore	Fish J (Jacob)
	Titolo	Practical multiscaling / / Jacob Fish
	Pubbl/distr/stampa	Chichester, West Sussex, U.K., : John Wiley & Sons Inc., 2014
	ISBN	9781118534847
		1118534840
	Edizione	[1st ed.]
	Descrizione fisica	xiii, 398 p. : ill. (some col.)
	Classificazione	501.1
		620.001/51
	Disciplina	620.001/51
	Soggetti	Continuum mechanics - Computer simulation
		Continuum mechanics - Mathematical models
		Materials - Computer simulation
		Materials - Mathematical models
		Mechanical engineering - Computer simulation
		Mechanical engineering - Mathematical models
		Multiscale modeling
		Scaling laws (Statistical physics)
	Lingua di pubblicazione	Inglese
	Formato	Materiale a stampa
	Livello bibliografico	Monografia
	Note generali	Includes bibliographical references and index
	Nota di bibliografia	Includes bibliographical references and index.
	Nota di contenuto	Chapter 1. Introduction to multiscale methods -- The rationale for multiscale computations -- The hype and the reality -- Examples and qualification of multiscale methods -- Nomenclature and definitions -- Notation -- Chapter 2. Upscaling/Downscaling of Continua -- Homogenizaton of linear heterogeneous media -- Upscaling based on enhanced kinematics -- Homogenization of nonlinear heterogeneous media -- Higher order homogenization -- Multiple-scale homogenization -- Going beyond upscaling : homogenization-based multigrid -- Chapter 3. Upscaling/Downscaling of Atomistic/Continuum Media -- Governing equations -- Generalized mathematical homogenization (GMH) -- Finite element implementation and numerical verification -- Statistical ensemble -- Verification -- Going beyond upscaling -- Chapter 4. Reduced Order Homogenization -- Reduced order homogenization for two-scale problems -- Lower

order approximation of eigenstrains -- Extension to nonlocal heterogeneous media -- Extension to dispersive heterogeneous media -- Extension to multiple spatial scales -- Extension to large deformations -- Extension to multiple temporal scales with application to fatigue -- Extension to multiphysics problems -- Chapter 5. Scale-separation-free Upscaling/Downscaling of Continua -- Computational continua (C2) -- Reduced order computational continua (RC2) -- Nonlocal quadrature in multidimensions -- Model Verification -- Chapter 6. Multiscale Design Software -- Microanalysis with MDS-Lite -- Macroanalysis with MDS-Lite.

| Sommario/riassunto | "Practical Multiscaling covers fundamental modelling techniques aimed at bridging diverse temporal and spatial scales ranging from the atomic level to a full-scale product level. It focuses on practical multiscale methods that account for fine-scale (material) details but do not require their precise resolution. The text material evolved from over 20 years of teaching experience at Rensselaer and Columbia University, as well as from practical experience gained in the application of multiscale software. This book comprehensively covers theory and implementation, providing a detailed exposition of the state-of-the-art multiscale theories and their insertion into conventional (single-scale) finite element code architecture. The robustness and design aspects of multiscale methods are also emphasised, which is accomplished via four building blocks: upscaling of information, systematic reduction of information, characterization of information utilizing experimental data, and material optimization. To ensure the reader gains hands-on experience, a companion website hosting a lite version of the multiscale design software (MDS-Lite) is available. Key features: Combines fundamental theory and practical methods of multiscale modelling Covers the state-of-the-art multiscale theories and examines their practical usability in design; covers applications of multiscale methods; accompanied by a continuously updated website hosting the multiscale design software; illustrated with colour images. Practical Multiscaling is an ideal textbook for graduate students studying multiscale science and engineering. It is also a must-have reference for government laboratories, researchers and practitioners in civil, aerospace, pharmaceutical, electronics, and automotive industries, and commercial software vendors"-- |