1. Record Nr. UNINA9910155328003321

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Titolo	Computational Multiscale Modeling of Fluids and Solids : Theory and Applications / / by Martin Oliver Steinhauser
Pubbl/distr/stampa	Berlin, Heidelberg : , : Springer Berlin Heidelberg : , : Imprint : Springer, , 2017
ISBN	9783662532249
Edizione	[2nd ed. 2017.]
Descrizione fisica	1 online resource (XXIII, 405 p. 139 illus., 34 illus. in color.)
Disciplina	530.1
Soggetti	Physics Materials science Computer mathematics Applied mathematics Engineering mathematics Geophysics Numerical and Computational Physics, Simulation Characterization and Evaluation of Materials Computational Mathematics and Numerical Analysis Mathematical and Computational Engineering Geophysics and Environmental Physics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Part I Fundamentals -- Introduction -- Multiscale Computational Materials Science -- Mathematical and Physical Prerequisites -- Fundamentals of Numerical Simulation -- Part II Computational Methods on Multiscales -- Summary of Part I -- Computational Methods on Electronic/Atomistic Scale -- Computational Methods on Atomistic/Microscopic Scale -- Computational Methods on Microscopic/Mesoscopic Scale -- Perspectives in Multiscale Materials Modeling -- Further Reading -- Mathematical Definitions -- Sample code for the main routine of a MD simulation -- A Sample Makefile -- Tables of Physical Constants -- List of Algorithms -- Selected Solutions.

Sommario/riassunto

The idea of the book is to provide a comprehensive overview of computational physics methods and techniques, that are used for materials modeling on different length and time scales. Each chapter first provides an overview of the basic physical principles which are the basis for the numerical and mathematical modeling on the respective length-scale. The book includes the micro-scale, the meso-scale and the macro-scale, and the chapters follow this classification. The book explains in detail many tricks of the trade of some of the most important methods and techniques that are used to simulate materials on the perspective levels of spatial and temporal resolution. Case studies are included to further illustrate some methods or theoretical considerations. Example applications for all techniques are provided, some of which are from the author’s own contributions to some of the research areas. The second edition has been expanded by new sections in computational models on meso/macroscopic scales for ocean and atmosphere dynamics. Numerous applications in environmental physics and geophysics had been added.