1.	Record Nr.	UNINA9910779437403321
	Autore	Cai Wei <1962->
	Titolo	Computational methods for electromagnetic phenomena : electrostatics in solvation, scattering, and electron transport / / Wei Cai [[electronic resource]]
	Pubbl/distr/stampa	Cambridge : , : Cambridge University Press, , 2013
	ISBN	1-139-61054-6 1-107-23570-7 1-139-61240-9 1-139-60888-6 1-139-10815-8 1-139-61612-9 1-139-62542-X 1-283-87054-1 1-139-62170-X
	Descrizione fisica	1 online resource (xviii, 444 pages) : digital, PDF file(s)
	Classificazione	TEC009000
	Disciplina	537.01/51
	Soggetti	Electromagnetism - Mathematical models Electrostatics Electron transport
	Lingua di pubblicazione	Inglese
	Formato	Materiale a stampa
	Livello bibliografico	Monografia
	Note generali	Title from publisher's bibliographic system (viewed on 05 Oct 2015).
	Nota di bibliografia	Includes bibliographical references and index.
	Nota di contenuto	Machine generated contents note: Part I. Electrostatics in Solvations: 1. Dielectric constant and fluctuation formulae for molecular dynamics; 2. Poisson-Boltzmann electrostatics and analytical approximations; 3. Numerical methods for Poisson-Boltzmann equations; 4. Fast algorithms for long-range interactions; Part II. Electromagnetic Scattering: 5. Maxwell equations, potentials, and physical/artificial boundary conditions; 6. Dyadic Green's functions in layered media; 7. High order methods for surface electromagnetic integral equations; 8. High order hierarchical Nedelec edge elements; 9. Time domain methods -- discontinuous Galerkin method and Yee scheme; 10. Computing scattering in periodic structures and surface plasmons; 11.

Solving Schrodinger equations in waveguides and quantum dots; Part III. Electron Transport: 12. Quantum electron transport in semiconductors; 13. Non-equilibrium Green's function (NEGF) methods for transport; 14. Numerical methods for Wigner quantum transport; 15. Hydrodynamics electron transport and finite difference methods; 16. Transport models in plasma media and numerical methods.

Sommario/riassunto

A unique and comprehensive graduate text and reference on numerical methods for electromagnetic phenomena, from atomistic to continuum scales, in biology, optical-to-micro waves, photonics, nanoelectronics and plasmas. The state-of-the-art numerical methods described include: • Statistical fluctuation formulae for the dielectric constant • Particle-Mesh-Ewald, Fast-Multipole-Method and image-based reaction field method for long-range interactions • High-order singular/hypersingular (Nystrom collocation/Galerkin) boundary and volume integral methods in layered media for Poisson-Boltzmann electrostatics, electromagnetic wave scattering and electron density waves in quantum dots • Absorbing and UPML boundary conditions • High-order hierarchical Nedelec edge elements • High-order discontinuous Galerkin (DG) and Yee finite difference time-domain methods • Finite element and plane wave frequency-domain methods for periodic structures • Generalized DG beam propagation method for optical waveguides • NEGF(Non-equilibrium Green's function) and Wigner kinetic methods for quantum transport • High-order WENO and Godunov and central schemes for hydrodynamic transport • Vlasov-Fokker-Planck and PIC and constrained MHD transport in plasmas