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Autore	Green Dan
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Nota di contenuto	Preface; Contents; 1. Symbolic Mathematics and Math Tools; 1.1 MATLAB Functions; 1.2 Symbolic Differentiation; 1.3 Symbolic Integration; 1.4 Taylor Expansion; 1.5 Series Summation; 1.6 Polynomial Factorization; 1.7 Equation Solving; 1.8 Inverse Functions; 1.9 Matrix Inversion; 1.10 Matrix Eigenvalues; 1.11 Ordinary Differential Equations; 1.12 Fourier Series; 1.13 Data Fitting; 1.14 MATLAB Utilities; 2. Classical Mechanics; 2.1 Simple Harmonic Oscillator; 2.2 Coupled Pendulums; 2.3 Triatomic Molecule; 2.4 Scattering Angle and Force Laws; 2.5 Classical Hard Sphere Scattering 2.6 Ballistics and Air Resistance 2.7 Rocket Motion - Symbolic and Numerical; 2.8 Taking the Free Subway; 2.9 Large Angle Oscillations - Pendulum; 2.10 Double Pendulum; 2.11 Coriolis Force; 2.12 Kepler Orbits-Numerical; 2.13 Analytic Kepler Orbits - Energy Considerations; 2.14 Stable Orbits and Perihelion Advance; 3. Electromagnetism; 3.1 Electric Potential for Point Charges; 3.2 Image Charge for a Grounded Sphere; 3.3 Magnetic Current Loop; 3.4 Helmholtz Coil; 3.5 Magnetic Shielding; 3.6 Potentials and Complex Variables; 3.7 Numerical Solution-Laplace Equation 3.8 Numerical Solution-Poisson Equation 3.9 Light Pressure and Solar Sailing; 3.10 Motion in Electric and Magnetic Fields; 3.11 The Cyclotron; 3.12 Dipole Radiation; 4. Waves and Optics; 4.1 Adding Waves; 4.2 Damped and Driven Oscillations; 4.3 A Plucked String; 4.4 A Circular Drum; 4.5 Diffraction by Slits and Apertures; 4.6 Edge Diffraction; 4.7

Doppler Shift and Cerenkov Radiation; 4.8 Reflection and Transmission at an Interface; 4.9 A Spherical Mirror; 4.10 A Spherical Lens; 4.11 A Magnetic Quadrupole Lens System; 5. Gases and Fluid Flow; 5.1 The Atmosphere
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7.3 The Relativistic Rocket

Sommario/riassunto

This book provides visualizations of many topics in general physics. The aim is to have an interactive MATLAB script wherein the user can vary parameters in a specific problem and then immediately see the outcome by way of dynamic "movies" of the response of the system in question. MATLAB tools are used throughout and the software scripts accompany the text in Symbolic Mathematics, Classical Mechanics, Electromagnetism, Waves and Optics, Gases and Fluid Flow, Quantum Mechanics, Special and General Relativity, and Astrophysics and Cosmology. The emphasis is on building up an intuition by running
