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variables for systems with n degrees of freedom*; 1.14. Summary; 1.15. Problem solving suggestions; 1.16. Conceptual questions; 1.17. Problems; Chapter 2. Superposition of Harmonic Oscillations, Fourier Analysis; 2.1. Superposition of two scalar and isochronous simple harmonic oscillations; 2.2. Superposition of two perpendicular and isochronous vector oscillations, polarization; 2.3. Superposition of two perpendicular and non-isochronous oscillations
2.4. Superposition of scalar non-synchronous harmonic oscillations, beats2.5. Fourier analysis of a periodic function; 2.6. Fourier analysis of a non-periodic function; 2.7. Fourier analysis of a signal, uncertainty relation; 2.8. Dirac delta-function; 2.9. Summary; 2.10. Problem solving suggestions; 2.11. Conceptual questions; 2.12. Problems; Chapter 3. Forced Oscillations; 3.1. Transient regime and steady regime; 3.2. Case of a simple harmonic excitation force; 3.3. Resonance; 3.4. Impedance and energy of a forced oscillator in the steady regime; 3.5. Complex impedance
3.6. Sustained electromagnetic oscillations3.7. Excitation from a state of equilibrium*; 3.8. Response to an arbitrary force, nonlinear systems*; 3.9. Excitation of a system of coupled oscillators*; 3.10. Generalization of the concepts of external force and impedance*; 3.11. Some applications; 3.12. Summary; 3.13. Problem solving suggestions; 3.14. Conceptual questions; 3.15. Problems; Chapter 4. Propagation in Infinite Media; 4.1. Propagation of one-dimensional waves; 4.2. Propagation of two- and three-dimensional waves; 4.3. Propagation of a vector wave
4.4. Polarization of a transverse vector wave4.5. Monochromatic wave, wave vector and wavelength; 4.6. Dispersion; 4.7. Group velocity; 4.8. Fourier analysis for waves*; 4.9. Modulation*; 4.10. Energy of waves; 4.11. Other unattenuated wave equations, conserved quantities*; 4.12. Impedance of a medium*; 4.13. Attenuated waves; 4.14. Sources and observers in motion, the Doppler effect and shock waves; 4.15. Summary; 4.16. Problem solving suggestions; 4.17. Conceptual questions; 4.18. Problems; Chapter 5. Mechanical Waves; 5.1. Transverse waves on a taut string
5.2. Strain and stress in elastic solids

Sommario/riassunto

Dealing with vibrations and waves, this text aims to provide understanding of the basic principles and methods of analysing various physical phenomena. The content includes the general properties of propagation, a detailed study of mechanical (elastic and acoustic) and electromagnetic waves, propagation, attenuation, dispersion, reflection, interference and diffraction of waves. It features chapters on the effect of motion of sources and observers (both classical and relativistic), emission of electromagnetic waves, standing and guided waves and a final chapter on de Broglie wa