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Nota di contenuto	Contents; List of symbols; 1 Son et lumiere; 1.1 Composites; 1.2 Rocks; 1.3 Biological matrix; 1.4 What else?; 2 Focusing and scanning; 2.1 Focused acoustic beams; 2.2 Scanning in transmission; 2.3 Reflection acoustic microscopy; 3 Resolution; 3.1 Diffraction and noise; 3.2 The coupling fluid; 3.3 Cryogenic microscopy; 3.4 Non-linear enhancement of resolution; 3.5 Aliasing; 3.6 Does defocusing degrade the resolution?; 4 Lens design and selection; 4.1 Interior imaging; 4.2 Surface imaging; 4.3 Wanted and unwanted signals; 5 Electronic circuits for quantitative microscopy 5.1 Time and frequency domains5.2 Quasi-monochromatic systems; 5.3 Very short pulse techniques; 6 A little elementary acoustics; 6.1 Scalar theory; 6.2 Tensor derivation of acoustic waves in solids; 6.3 Rayleigh waves; 6.4 Reflection; 6.5 Materials constants; 7 Contrast theory; 7.1 Wave theory of V(z); 7.2 Ray model of V(z); 7.3 Tweedledum or Tweedledee?; 8 Experimental elastic microanalysis; 8.1 Measurement of the reflectance function; 8.2 Ray methods; 8.3 Time-resolved techniques; 8.4 Phew!; 9 Biological tissue; 9.1 A soft option; 9.2 Cell cultures; 9.3 Histological sections

9.4 Stiff tissue; 9.5 Bone; 10 Layered structures; 10.1 Subsurface imaging; 10.2 Waves in layers; 10.3 Near surface imaging; 10.4 Layers edge on; 11 Anisotropy; 11.1 Bulk anisotropy; 11.2 Waves in anisotropic surfaces; 11.3 Anisotropic reflectance functions; 11.4 Cylindrical lens anisotropic $V(z)$; 11.5 Spherical lens anisotropic $V(z)$; 11.6 Plastic deformation; 11.7 Grain boundaries; 12 Surface cracks and boundaries; 12.1 Initial observations; 12.2 Contrast theory of surface cracks; 12.3 Extension to three dimensions; 12.4 How fine a crack can you see?; 12.5 Contrast at boundaries; 12.6 Time-resolved measurements and crack tip diffraction; 13 Acoustically excited probe microscopy; 13.1 Mechanical diode detection; 13.2 Experimental UFM implementation; 13.3 UFM contrast theory; 13.4 Quantitative measurements of contact stiffness; 13.5 UFM picture gallery; 13.6 Image interpretation - effects of adhesion and topography; 13.7 Superlubricity; 13.8 Defects below the surface; 13.9 Time-resolved nanoscale phenomena; 14 So what happens when you defocus?; References; Index; A; B; C; D; E; F; G; H; I; J; K; L; M; N; O; P; Q; R; S; T; U; V; W; Y; Z

Sommario/riassunto

Acoustic microscopy enables the elastic properties of materials to be imaged and measured with the resolution of a good microscope. By using frequencies in the microwave regime, it is possible to make the acoustic wavelength comparable with the wavelength of light, and hence to achieve a resolution comparable with an optical microscope. Solids can support both longitudinal and transverse acoustic waves. At surfaces a unique combination of the two known as Rayleigh waves can propagate, and in many circumstances these dominate the contrast in acoustic microscopy. Following the invention of scanning