

Elasticity (4 lectures)

Stress and strain

- stress
- equilibrium
- strain

Linear elastic behaviour

- Hooke's law
- measurement of elastic moduli
- data

Generalized Hooke's law for anisotropic materials

- matrix approach
- symmetry
- elastic strain energy of anisotropic material

Physical origin of elastic moduli

- Crystalline materials, glasses: bonding, energy-separation curve
- Rubbers: entropy, random walk theory

Control of Modulus

- crystals and glasses; rubbers; composites; cellular solids

Composites

- fibres
- particulates
- laminates; elastic analysis of bimaterial

References

Ashby MF Elastic Deformation handout

Hertzberg RW (1996) pages 1-16; 31-36; 41-42