

# 7 Applications of Elasticity

The linear elastic model was introduced in the previous chapter and some elementary problems involving elastic materials were solved there (in particular in section 6.2). In this Chapter, five important, practical, theories are presented concerning elastic materials; they all have specific geometries and are subjected to particular types of load. In §7.1, the geometry is that of a long slender bar and the load is one which acts along the length of the bar; in §7.2, the geometry is that of a long slender circular bar and the load is one which twists the bar; in §7.3 the geometry is that of a thin-walled cylindrical or spherical component, and the load is normal to these walls; in §7.4 the geometry is that of a long and slender beam, and the load is transverse to the beam length. Finally, in §7.5, the geometry is a column, fixed at one end and loaded at the other so that it deflects. These five particular situations allow for simplifications (or approximations) to be made to the full three-dimensional linear elastic stress-strain relations; this allows one to write down simple expressions for the stress and strain and so solve some important practical problems analytically.

