

Isothermal Solid Mechanics

In this chapter, we state a variety of axioms for a mechanical theory of continuum bodies. As in Chapter [cha:mass-forces], we first state laws in integral form, and then derive local versions, which yield (systems of) PDEs. It is important to state at the outset that these laws apply to all continuum bodies, regardless of whether they are solid or fluid.

Aims:

By the end of this chapter, you should be able to:

- Provide definitions of the *mass*, *linear* and *angular momentum* of a subset of body as integrals.
- Explain why we must include a description of temperature in a continuum theory of matter.
- State the physical principles of the *conservation of mass*, *laws of inertia*, and the *first and second laws of thermodynamics* as used in continuum mechanics.
- Using physical principles and theorems to derive local forms of the balance laws, in both the Eulerian and Lagrangian formalisms.
- Explain how the principle of *frame indifference* limits the constitutive laws which are possible to close the equations derived.