Exercise: Units of the wave equation

mass × acceleration = forces

$[kg]$ $\left[\frac{m}{s^2}\right]$ $[N] = \left[\frac{kg\ m}{s^2}\right]$ Newton

We mostly use the wave equation written as

$$\rho\, \partial_t^2 \underline{u} - \underline{\nabla} \cdot \underline{\underline{T}} = \underline{f}$$

What are the corresponding units?

The material properties are given by

- density ρ
- bulk & shear modulus, Young modulus, Lamé parameters

  → what follows for the elastic tensor $\underline{\underline{c}}$?

Consider Hooke's law

$$\underline{\underline{T}} = \underline{\underline{\underline{c}}} : \underline{\underline{\varepsilon}}$$ with strain $\underline{\underline{\varepsilon}}$ and stress $\underline{\underline{T}}$

What are the units of $\underline{\underline{T}}$ and $\underline{\underline{\varepsilon}}$?