Maximum shear stress

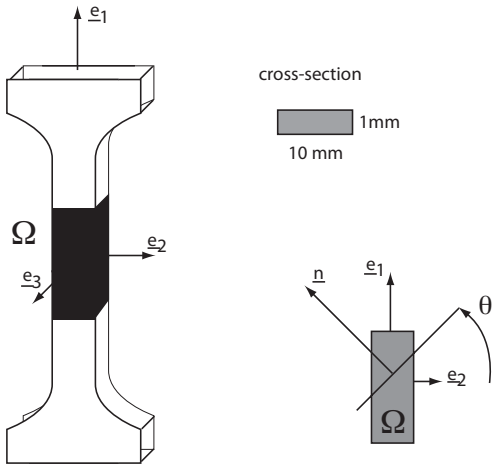

Figure 1: Tensile test. We assume an homogeneous stress state within the central part of the sample.

We assume that during a tensile test (figure **??**), the stress state is homogeneous within the part Ω of a material sample. For any material point of Ω, the local stress tensor is:

$$\underline{\underline{\sigma}} = 100 \cdot \underline{e_1} \otimes \underline{e_1} \tag{1}$$

Question 1 Calculate the global force $\underline{F}$ that is applied on the material sample by the experimental tensile device.

Question 2 We cut the sample by a "fictive" plane. The orientation of this plane is denoted by the angle θ between the $\underline{e_2}$ axis and the unit normal vector $\underline{n}$. Calculate as a function of θ the stress vector applied on this surface.

Question 3 Find the value of θ for which the shear stress is maximum.