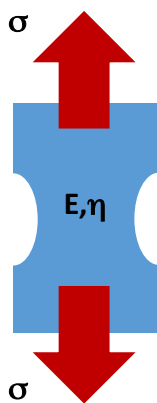


A SHORT COURSE ON MATERIALS RESISTANCE

When we want to describe a material under strain we can use three parameters, which are specific to the studied material: Young's modulus, Poisson's ratio, and the shear modulus. The first two refer to traction and compression, whereas the last one deals with shear strains.



Traction and compression.

When we pull on an object, we apply a traction strain. The rigidity in the traction of the material is given by its Young's modulus E (GPa). Moreover, for usual materials, we notice that the sample shrinks transversally. It is called Poisson's effect. This stress is perpendicular to the axial strain and is characterized by the Poisson's ratio (η) of the material. The bigger it is, the more the sample shrinks for a given strain.

Fig1: Schematic of a traction test.

Shear Strain.

When we apply two forces in opposite directions (as if we wanted to tear the sample) we generate a shear strain. The rigidity in shear is given by the shear modulus G (GPa) of the material.

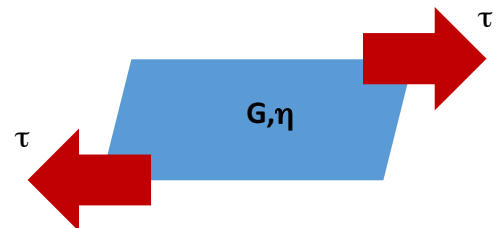


Fig2: Schematic of a shear test.

Where,

$$G = \frac{E}{2(1 + \eta)}$$

Our Materials

	Cellulose	Silica
E (GPa)	3.23	70.2
G (GPa)	1.17	30.0
η	0.38	0.17