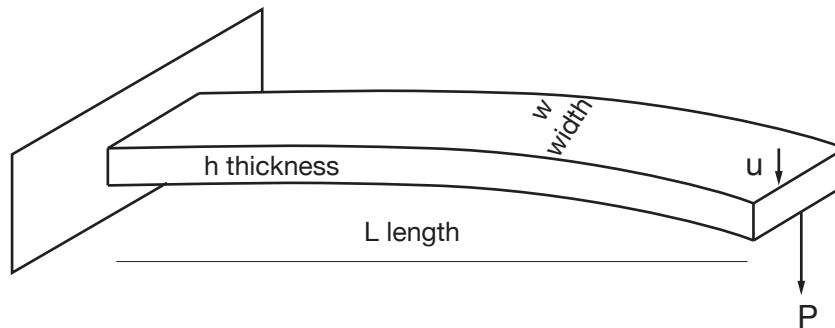


## 06O: Stiffness of a double cantilever beam

The expression for the deflection,  $u$ , upon applying a force  $P$  to a single beam cantilever is given by



$u = \frac{PL^3}{3EI}$ , where  $I$  is the moment of inertia, which depends on the cross-section of the beam and is given by

$$I = \frac{wh^3}{12}$$

Derive the expression for the stiffness of a *double cantilever* specimen used to measure the fracture toughness

$$k = \frac{P}{2u}$$

Calculate the deflection when a load of 10 N is applied to a double cantilever for a specimen made from silicon having a length of 10 mm, a thickness of 0.1 mm and a width of 2 mm.

The elastic modulus of silicon is 140 GPa.