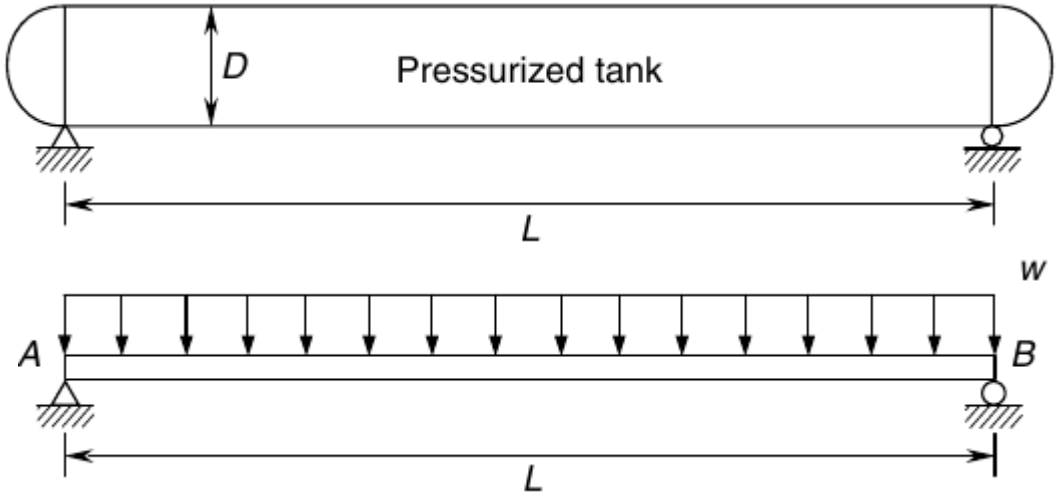
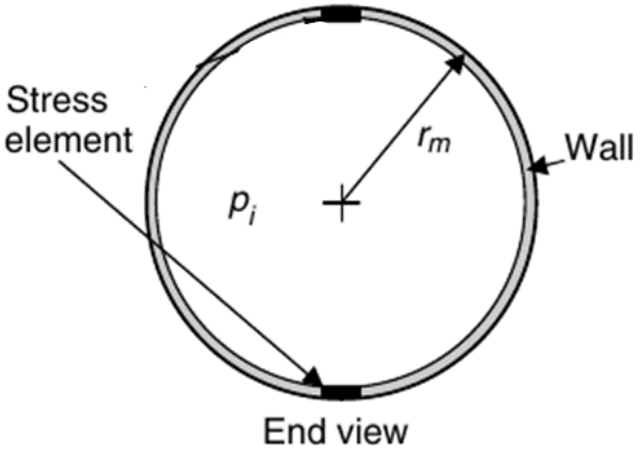
Design exercise 1

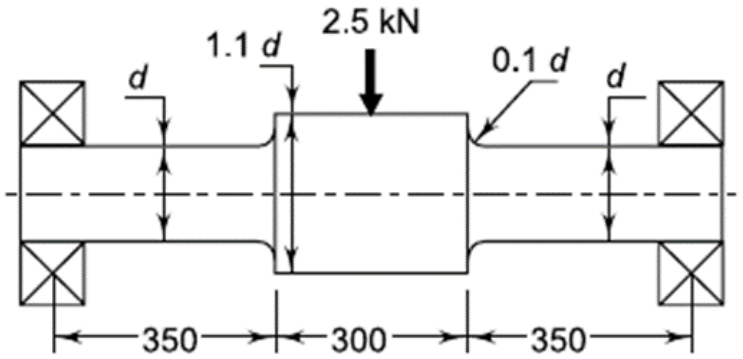
Determine the stresses on the bottom element (at the mid span) for the pressurized tank modeled by the simply-supported beam where pressure pi = 1.4 MPa, inner diameter D = 2 m, thickness t = 0.013 m; uniform loading w = 24,300 N/m, length L = 8m;
(Determine the stresses on the element oriented along the welds of the cylindrical tank given the weld angle θ = 60 CCW)

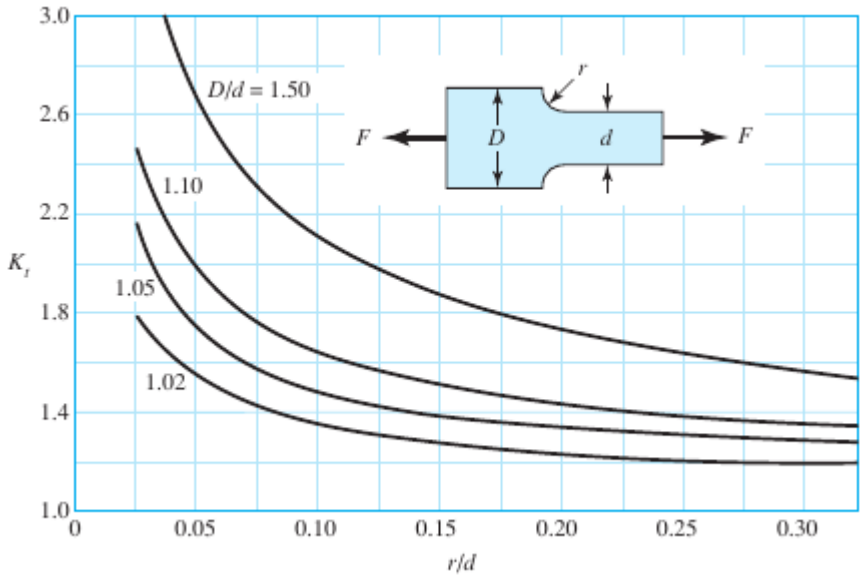




Design exercise 2

A non-rotating shaft supporting a load of 2.5 kN is shown. The shaft is made of brittle material, with an ultimate tensile strength of 300 MPa. The factor of safety is 3. Determine the shaft diameter *d*





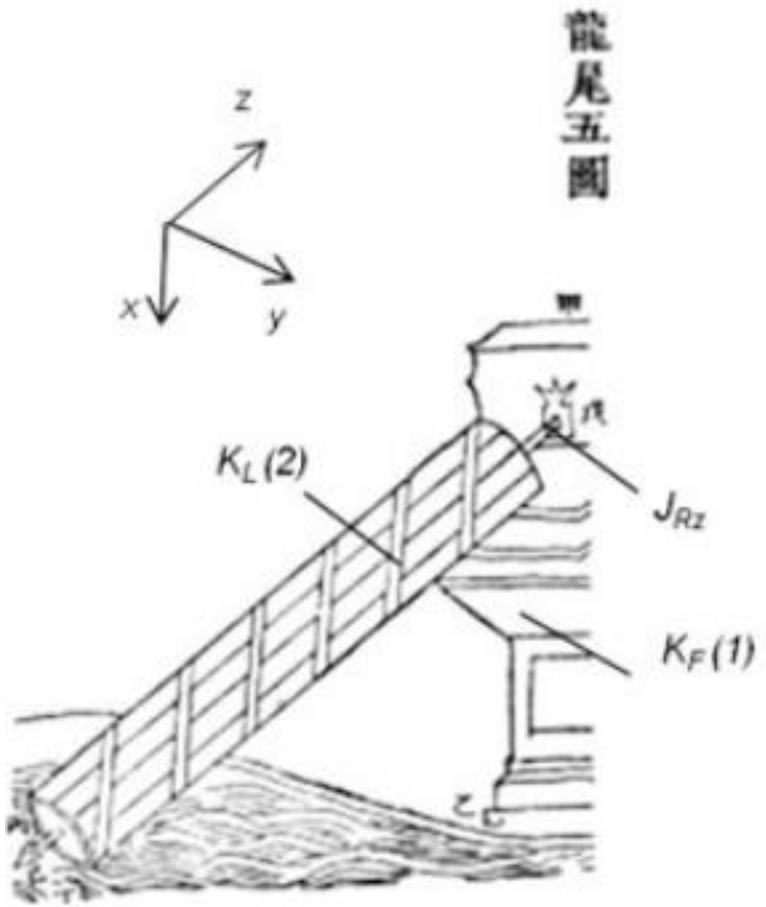
Rectangular filleted bar in tension or simple compression. $\sigma_0 = F/A$, where $A = dt$ and t is the thickness.

Announcement

You should be able to apply the theory to project 1 to analyse any stress concentrations in your design

Ancient Chinese mechanisms

An Archimedean screw (龍尾)



How would you analyse the stress concentrations in the device?