

ENSC-283

Assignment #3

Assignment date: Monday Jan. 26 2009

Due date: Monday Feb. 2, 2009

Problem1: (force components on a curved submerged surface)

The gate shown in Fig. 1 is hinged at o and has constant width, $w = 5 \text{ m}$. The equation of the surface is $x = y^2/a$, where $a = 4 \text{ m}$. The depth of water to the right of the gate is $D = 4 \text{ m}$. Find the magnitude of force, F_a , applied as shown, required to maintain the gate in equilibrium if the weight of the gate is neglected.

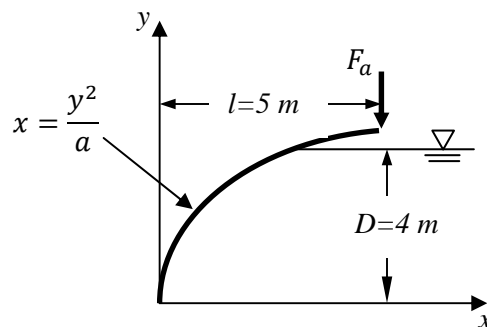


Figure 1 curved gate

Problem2: (free surface shape of liquid in a rotating tank)

It has been suggested that the angular velocity, ω , of a rotating body or shaft can be measured by attaching an open cylinder of liquid, as shown in Fig. 2, and measuring with some type of depth gage, the change in the fluid level, $H - h_0$,

caused by the rotation of the fluid. Determine the relationship between this change in fluid level and the angular velocity.

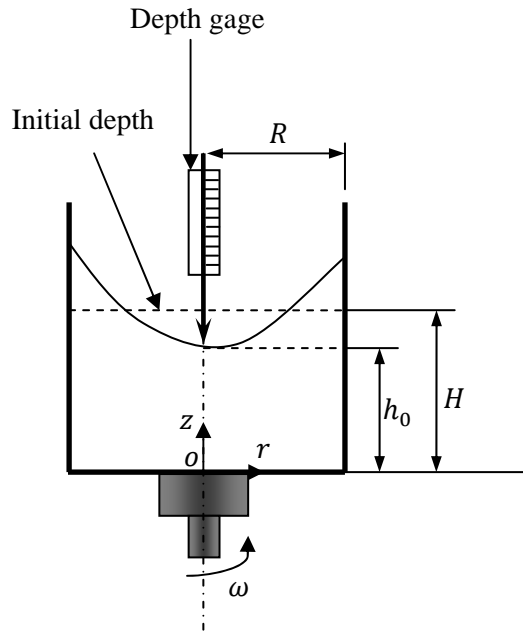


Figure 2 rotating body