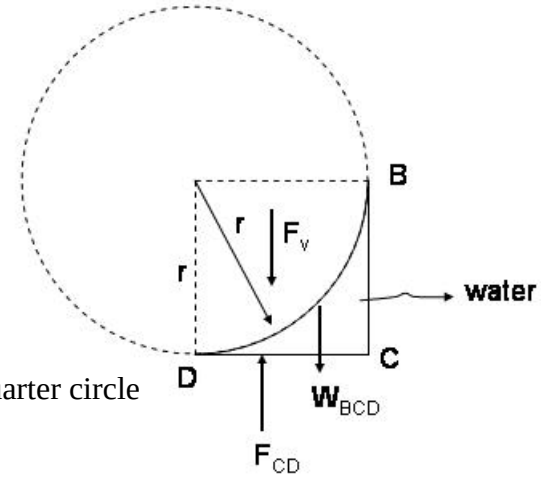
CIEG 305 HYDROSTATIC FORCES ON CURVED SURFACES

Proof: why does vertical force on curved surface equal weight of fluid above even when the fluid is below?



$$F_{CD} = F_V + W_{BCD}$$

$$F_V = F_{CD} - W_{BCD}$$

$W_{BCD} = \gamma Ab$, b equals distance in to paper

$W_{BCD} = \gamma b\left(r^2 - \frac{\pi r^2}{4}\right)$, the square minus the quarter circle

$$F_{CD} = \gamma rA = \gamma r(rb) = \gamma br^2$$

THUS

$$F_V = \gamma br^2 - \gamma b\left(r^2 - \frac{\pi r^2}{4}\right)$$

$$F_V = \gamma br^2 - \gamma br^2 + \gamma b\frac{\pi r^2}{4}$$

$F_V = \gamma b\frac{\pi r^2}{4}$, this is the weight of the fluid above the surface even though it is not there!