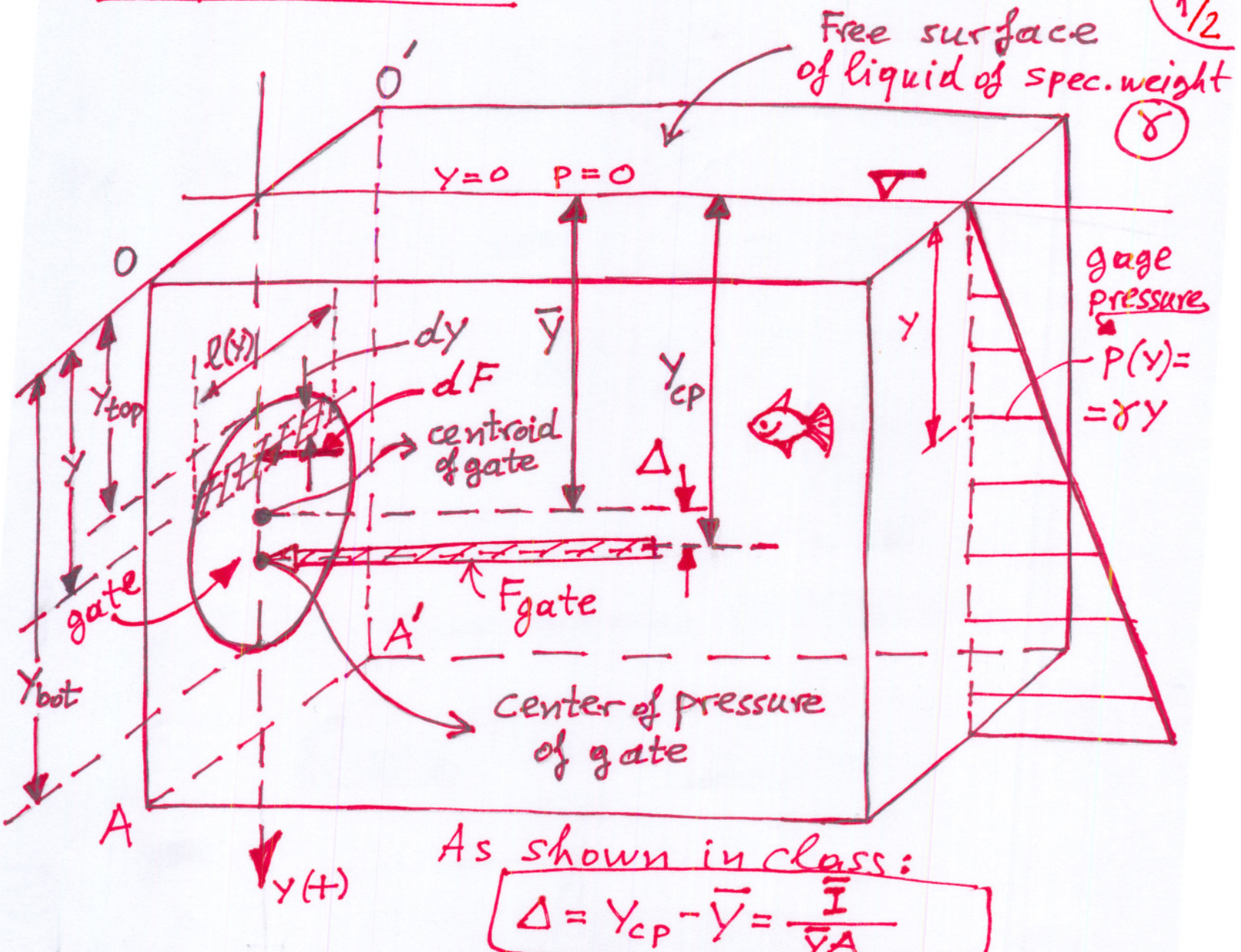
Forces on flat gate CE319F

Perspective view



As shown in class:

$$\Delta = Y_{cp} - \bar{Y} = \frac{\bar{I}}{\bar{Y}A}$$

dF: Elementary pressure force acting normal to the shown (shaded) gate strip of height dy and length ℓ(y); $dF = p(y)\,dA$

dA: elementary area of gate strip; $dA = \ell(y)\,dy$

F_{gate}: Total pressure force acting normal to the gate

A: total area of gate

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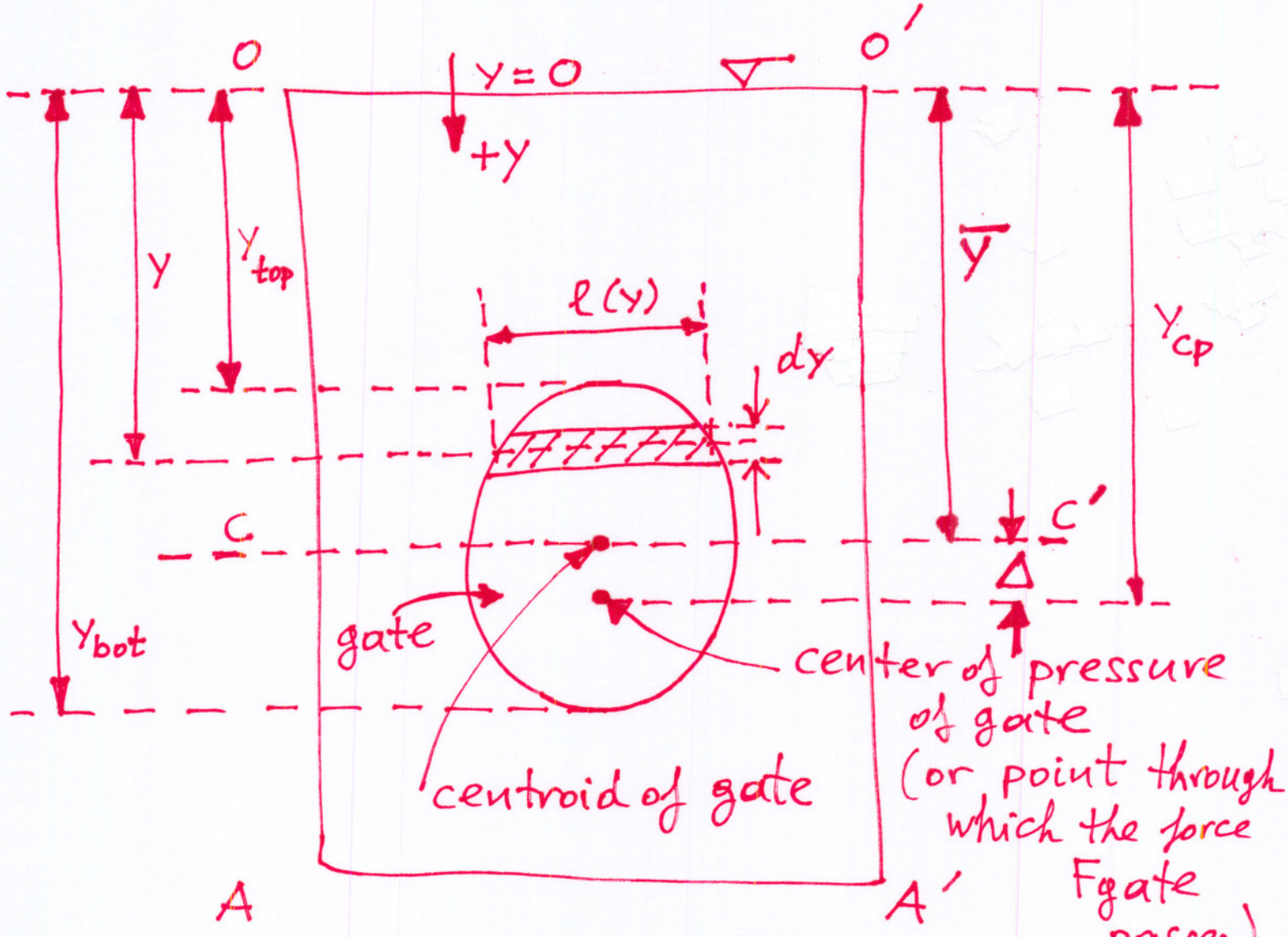
Looking from a direction normal to the gate



CC': Horizontal axis through gate centroid

$I_{OO'}$: Moment of inertia of gate w.r.t. OO'

$I_{CC'}$: " " " " " " CC'

$$I_{OO'} = I_{CC'} + \bar{y}^2 A$$

"parallel-axis theorem"

$I_{CC'}$ also denoted as $\bar{I}$