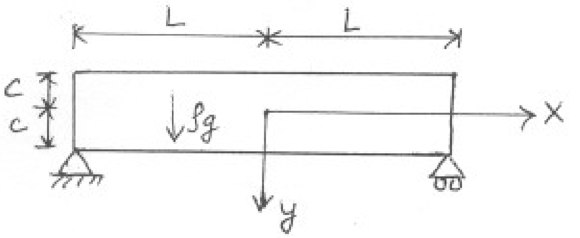
1. Consider the simply supported thin plate under the action of its own weight. Determine the stress function using the polynomial approach, starting from the polynomial of degree one. Hence determine the stresses.

2. The gravity wall shown has a density ρ and the liquid retained by it has a density γ. Assuming $\sigma_y = xf[y]$, determine the stresses in the wall. (Hint: double-integrate σ_y to get the functional form for the stress function $\phi[x, y]$, put this result in the biharmonic equation and proceed to get a more definite form for ϕ as a polynomial. Determine the coefficients of the polynomial from the BC's).

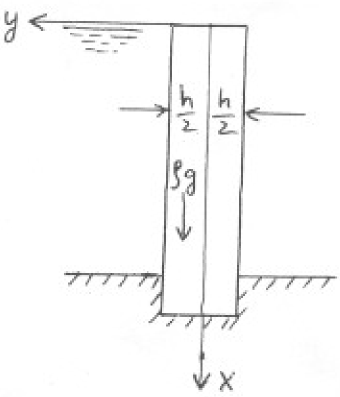
3. The solution for the problem of a concentrated normal load P acting on the straight boundary of a semi-infinite plate (see Fig. P3a) is given by $\sigma_r = -2P\cos[\theta]/(\pi r)$, $\sigma_\theta = 0$, $\sigma_{r\theta} = 0$. Using this solution, obtain the stresses $\sigma_x, \sigma_y, \sigma_{xy}$ at A for an arbitrary α for the modified problem shown in Fig. P3b. Find the maximum shear stress at A when $\alpha = \pi/4$.

4. A rectangular plate is subject to a uniform shearing load of intensity q on its edges. Find the maximum and minimum normal stresses around a hole in the plate that is located far away from its boundaries.

5. A wedge of infinite length is subject to uniform shear q acting along its edges as shown. Thus it can be assumed that the stresses are independent of r, i.e., $\phi = r^2 f[\theta]$. Obtain the stresses.

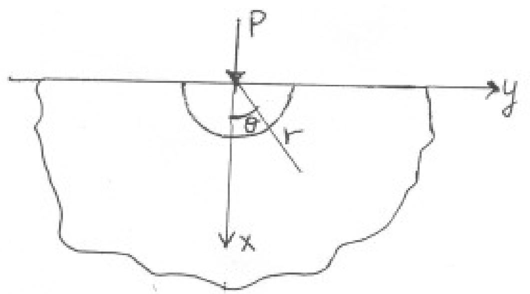


P.1

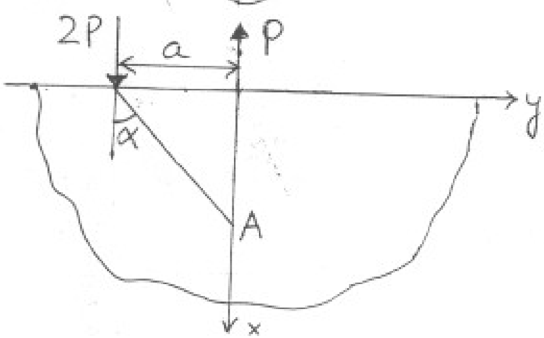


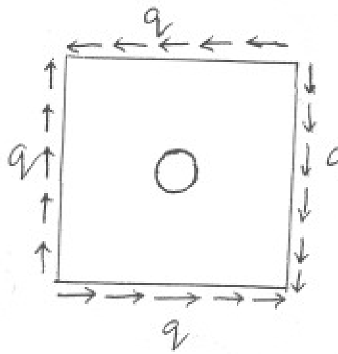
P.2

P.3a

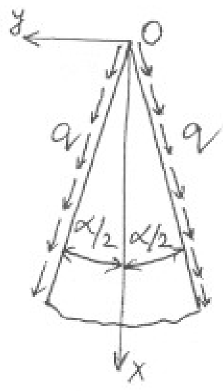


P.3b





P.4



P.5