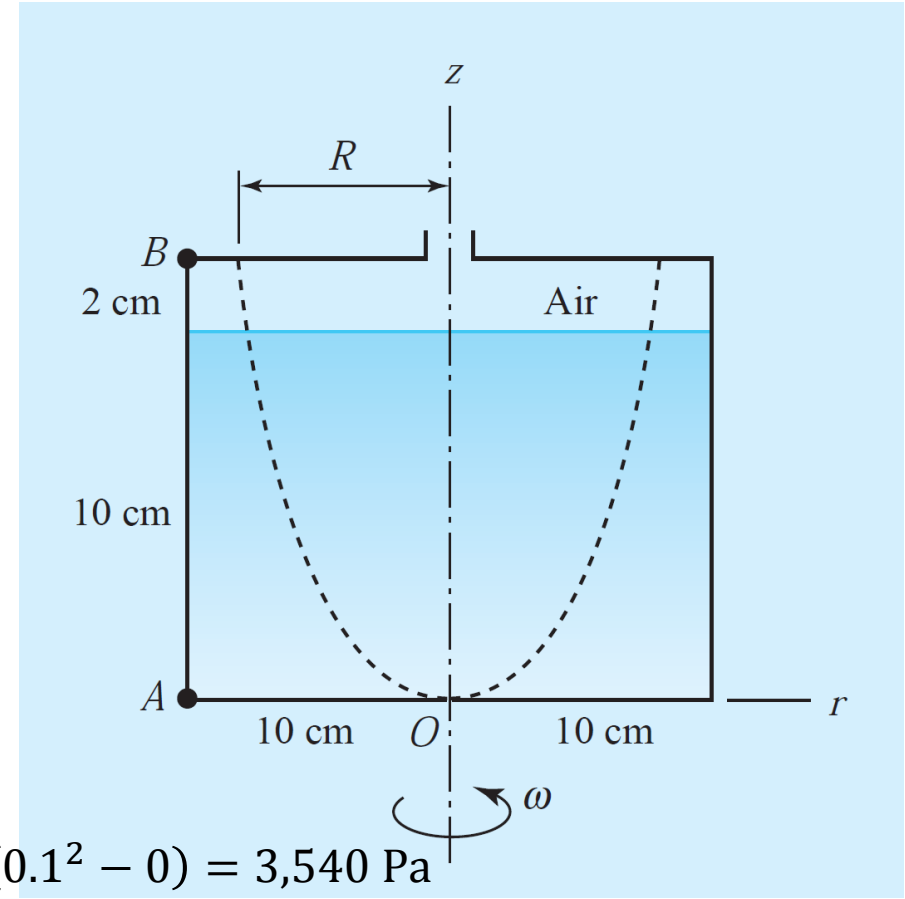
The cylinder shown in the Figure below ($R_C = 10$ cm) is rotated about its centerline. Calculate the rotational speed that is necessary for the water to just touch the origin *O*. Also, find the pressures at *A* and *B*.



$$\pi \times R_C^2 \times 2 = \frac{1}{2}\pi R^2 \times 12$$

$$R = \frac{R_C}{\sqrt{3}} = \frac{10}{\sqrt{3}} = 5.77 \text{ cm}$$

$$\frac{\omega^2 R^2}{2} = gz$$

$$\omega = \frac{\sqrt{2gz}}{R} = \frac{\sqrt{2 \times 9.81 \times 0.12}}{0.0577} = 26.6 \text{ s}^{-1}$$

$$p_A = p_O + \frac{\rho\omega^2}{2}(r_A^2 - r_0^2) = 0 + \frac{1{,}000 \times 26.6^2}{2}(0.1^2 - 0) = 3{,}540 \text{ Pa}$$

$$p_B - p_A = -\rho g(z_B - z_A)$$

$$p_B = p_A - 1{,}000 \times 9.81(0.12 - 0) = 2{,}360 \text{ Pa}$$