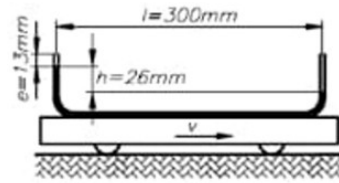


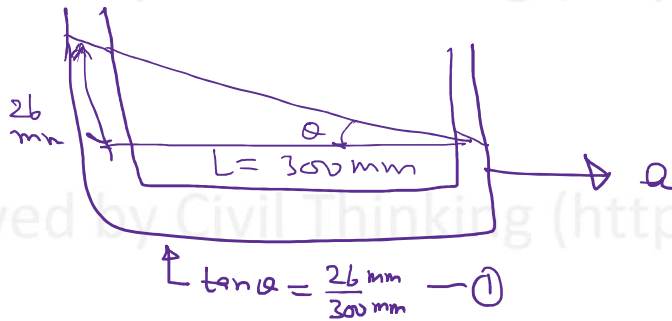
Hydrostatics- accelerometer problem solution

The tube for measuring acceleration (accelerometer) has been placed on the vehicle. What is the instantaneous acceleration of the vehicle if the levels of the liquid menisci are as shown in the diagram? What is the maximum acceleration that can be measured by this device without losing liquid?

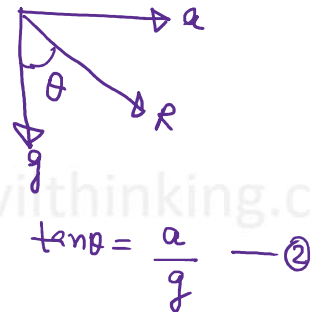


Solution:

Instantaneous case:

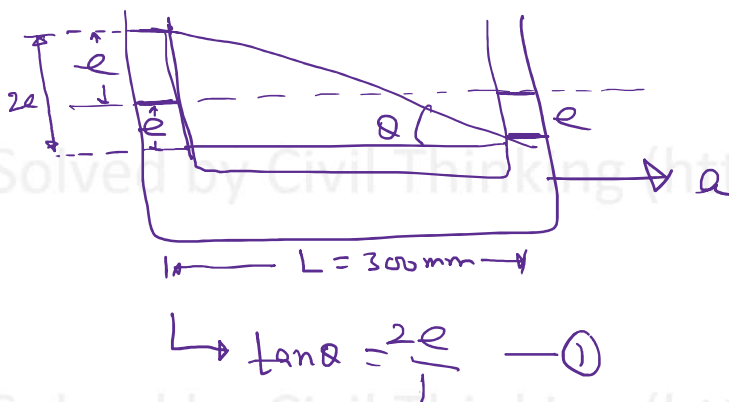


Force Diagram:

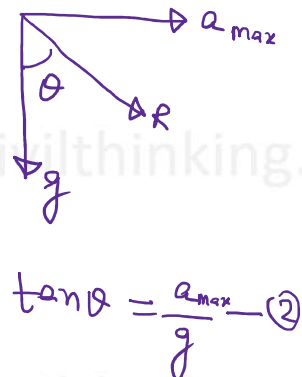


From ① & ②, $\frac{26 \text{ mm}}{300 \text{ mm}} = \frac{a}{g} \Rightarrow a = 9.81 \text{ m/s}^2 \times \frac{26}{300} = 0.85 \text{ m/s}^2$ Ans. 1
 [$\because g = 9.81 \text{ m/s}^2$]

Max acceleration case:



Force diagram



From ① & ② $2e = a_{\max}$

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$$\text{From ① \& ②, } \frac{2e}{L} = \frac{a_{\max}}{g} \Rightarrow a_{\max} = \frac{2e}{L} g$$

$$e = 13 \text{ mm}, L = 300 \text{ mm}, g = 9.81 \text{ m/s}^2$$

$$\Rightarrow a_{\max} = \frac{2 \times 13}{300} \times 9.81 = 0.85 \text{ m/s}^2 \quad \underline{\underline{\text{Ans. 2}}}$$

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