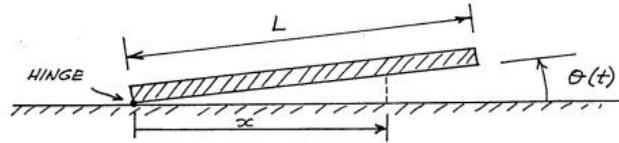


MIT Department of Mechanical Engineering  
2.25 Advanced Fluid Mechanics

**Problem 3.05**

*This problem is from "Advanced Fluid Mechanics Problems" by A.H. Shapiro and A.A. Sonin*



A long, flat plate of breadth  $L$  ( $L$  being small compared with the length perpendicular to the sketch) is hinged at the left side to a flat wall, and the gap between the plate and wall is filled with an incompressible liquid of density  $\rho$ . If the plate is at a *small* angle  $\theta(t)$  and is depressed at an angular rate

$$\omega(t) = -\frac{d\theta}{dt},$$

obtain an expression for the average liquid speed  $u(x, t)$  in the  $x$ -direction at station  $x$  and time  $t$ .

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