Chapter 6. Applications of Definite Integrals

6.7. Fluid Pressures and Forces

Recall. The pressure p at depth h in a fluid of weight-density w is $p = wh$ (assuming the fluid is stationary — a moving fluid will exert less pressure; that's how an airfoil works).

Definition. Suppose that a plate submerged vertically in fluid of weight-density w runs from $y = a$ to $y = b$ on the y-axis. Let $L(y)$ be the length of the horizontal strip measured from left to right alon ghte surface of the plate at level y. Then the force exerted by the fluid against one side of the plate is

$$F = \int_a^b w(\text{strip depth})L(y)\,dy.$$

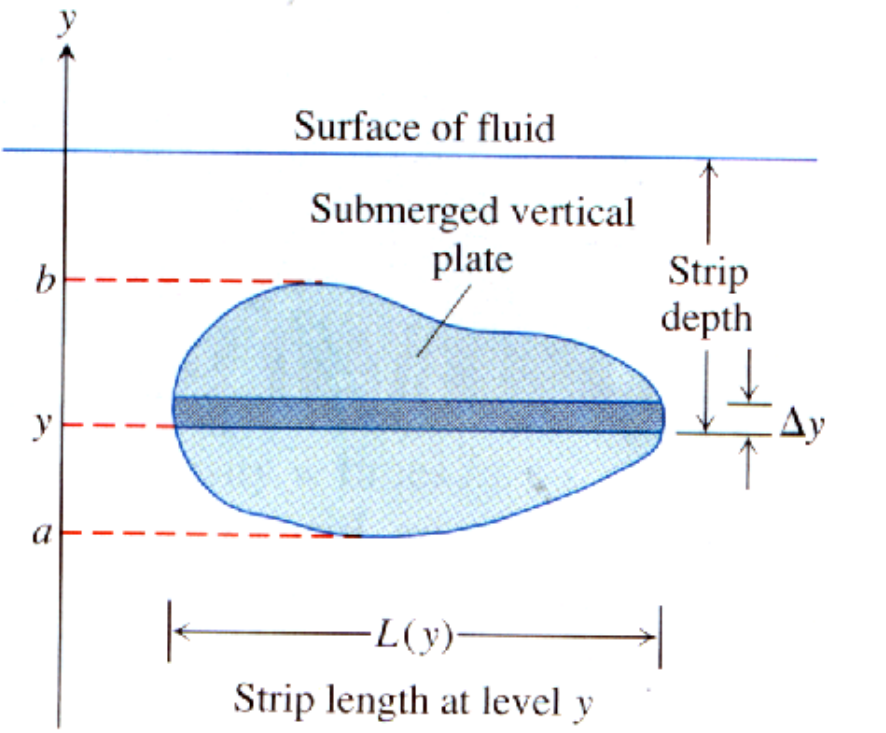

Figure 6.66, page 457.

Examples. Page 459 number 8, page 460 number 14.