Example 4:

A gate that is 5.00 ft wide and 10.0 ft long lies at an angle $\theta$ with seawater on one side and atmospheric air on the other side as shown. It is hinged at the lowest depth of 15.0 ft at point B and rests against a smooth wall 9.00 ft deep at point A. Find the following:

(a) resultant force on the gate due to the seawater pressure,
(b) horizontal force exerted by the wall at point A, and
(c) reactions at hinge B.

Known: Rectangular gate submerged in seawater with atmospheric air on bottom, $w = 5.00$ ft, $L = 10.0$ ft, $H = 15.0$ ft, $h_1 = 9.00$ ft

Assumptions: Incompressible liquid, static fluid, negligible dam weight and end effects

Find: (a) $F_R$, (b) $A_H$, (c) $B_H$ and $B_V$

Solution:

Properties: specific weight of seawater, $\gamma = \rho g = 64.0$ lbf/ft$^3$

Answers: (a) 38,400 lbf, (b) 29,300 lbf, (c) 6,290 lbf and 30,700 lbf