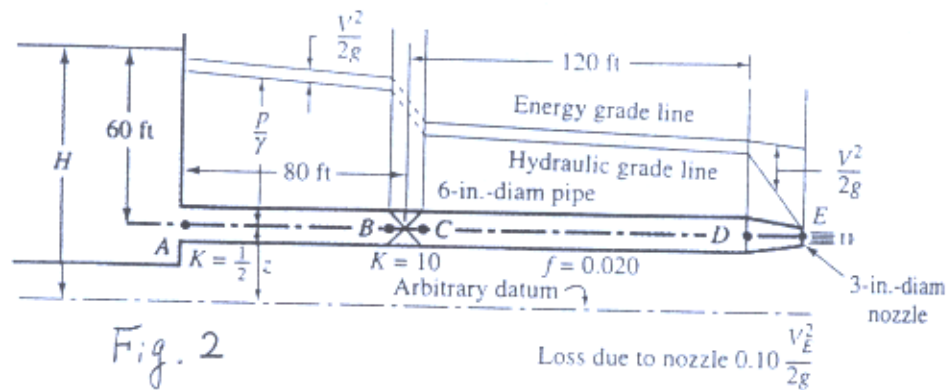
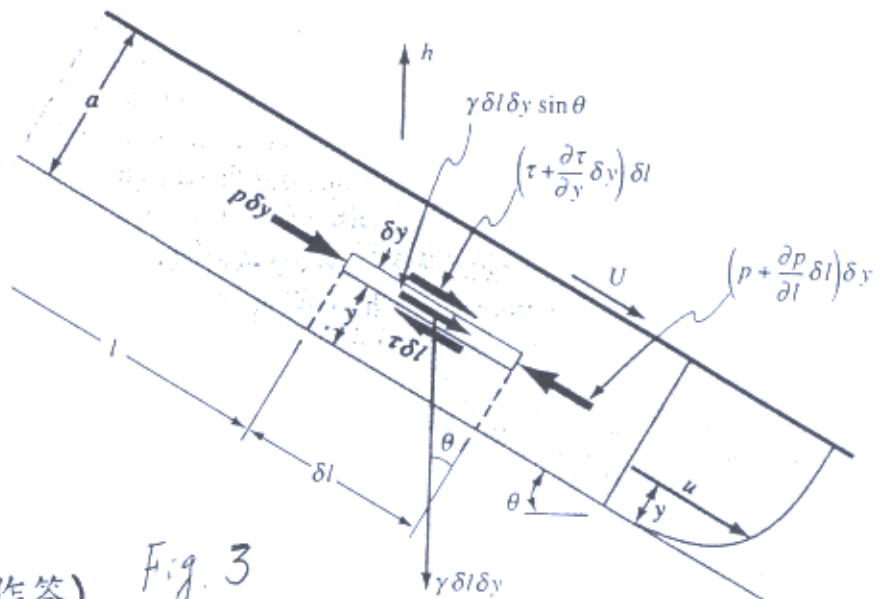


1. A trapezoidal channel, with side slope 2:1, is to carry 20 m³/s with a bottom slope of 0.0009. Determine the bottom width, depth, and velocity for the best hydraulic section. $n = 0.025$. (20%)
2. Determine the elevation of hydraulic and energy grade line at point A, B, C, D, and E of Fig. 2, $z = 10$ ft. (20%)



3. (a). Determine the formula for the velocity distribution for flow in Fig.3 when an adverse pressure gradient exists such that $q = 0$. (10%)
 (b). In Fig.3, with U positive as shown, find the expression for the discharge such that the shear is zero at the fixed plate. (10%)



(背面仍有題目,請繼續作答)

4. The vertical reducing section shown in Fig. 4 contains oil, sp gr 0.86, flowing upward at the rate of $0.6 \text{ m}^3/\text{s}$. The pressure at the larger section is 20 kPa. Neglecting losses but including gravity, determine the force on the contraction. (20%)

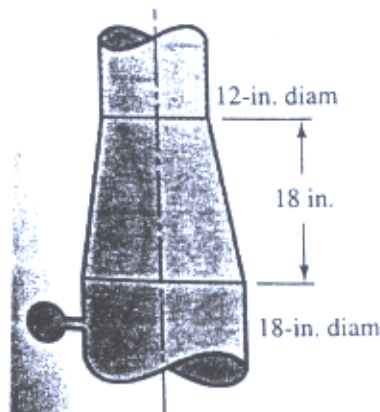
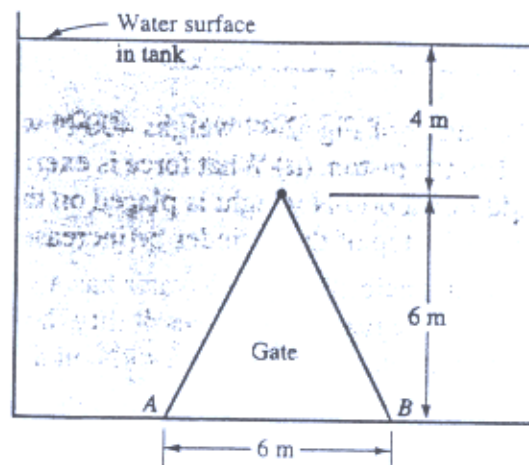


Fig. 4

5. (a). Determine the magnitude of force acting on one side of vertical surface of triangle ABC in Fig. 5 by integration. (10%)
 (b). Locate the pressure center of vertical area of triangle ABC in Fig. 5 by integration. (10%)



$$\gamma = 9806 \text{ N/m}^3$$

Fig. 5