1. Water flows steadily through the large tanks shown in Fig. 1. Determine the water depth, $h_A$. (25%)

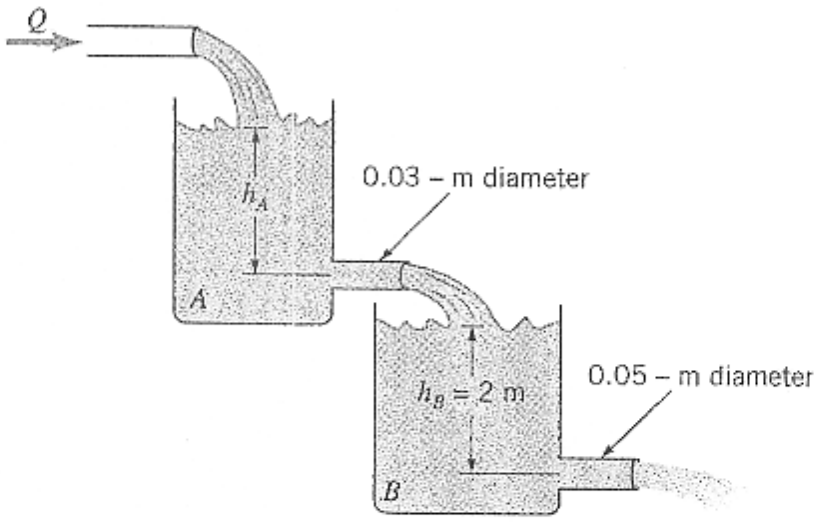


Figure 1

2. The fluid velocity along the $x$ axis shown in Fig. 2 varies from 12 m/s at point A to 36 m/s at point B. It is also known that the velocity is a linear function of distance along the streamline. Determine the acceleration at points A, B, and C. Assume steady flow. (25%)

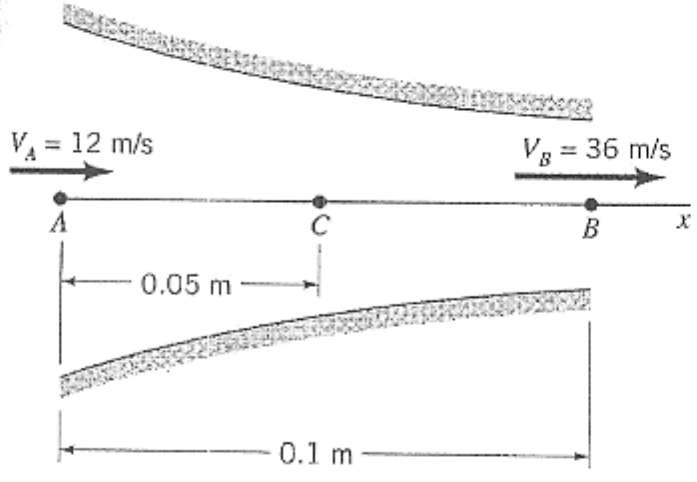


Figure 2

3. The design of a river model is to be based on Froude number similarity, and a river depth of 4 m is to correspond to a model depth of 100 mm. Under these conditions what is the prototype velocity corresponding to a model velocity of 3 m/s? (25%)

4. An incompressible, Newtonian fluid flows steadily between two infinitely long, concentric cylinders as shown in figure. The outer cylinder is fixed, but the inner cylinder moves with a longitudinal velocity $V_0$ as show. For what value of $V_0$ will the drag on inner cylinder be zero? Assume that the flow is laminar, axisymmetric, and fully developed. (25%)