

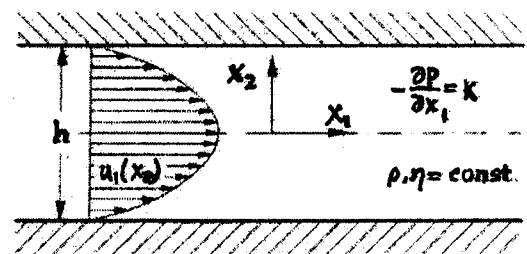
本試題是否可以使用計算機: 可使用, 不可使用 (請命題老師勾選)

1. What is the difference between the Eulerian and the Lagrangian coordinates in the fluid mechanics? (10%)
2. What is the *separation* phenomenon of the fluid pass through a boundary? (10%)
3. What is the Potential Flows? (10%)
4. From the fluid mechanics view point, describe the characteristics of blood fluid. (20%)
5. Oil with a kinematic viscosity of $6 \times 10^{-4} \text{ m}^2/\text{s}$ flows in a pipe (diameter = 15cm) at a rate of $0.02 \text{ m}^3/\text{s}$. Determine whether this flow is laminar or turbulent? (20%)
6. Incompressible Newtonian fluid with constant density (ρ) and viscosity (η) flows between two parallel plates (distance = h) with infinite width as shown in the figure below. The components of the pressure gradient are:

$$\frac{\partial p}{\partial x_1} = -K; \quad \frac{\partial p}{\partial x_2} = 0; \quad \frac{\partial p}{\partial x_3} = 0;$$

And the velocity field between the two plates are:

$$u_1(x_2) = \frac{K}{2\eta} \left(\frac{h^2}{4} - x_2^2 \right); \quad u_2 = 0; \quad u_3 = 0$$



- (a) Show that the given velocity field satisfies the continuity and the Navier-Stokes equation. (20%)
 - (b) Determine the components of the stress tensor. (10%)
- (Note: neglecting the body force)