淡江大學八十八學年度碩士班招生考試試題

P.1

系別：化學工程學系　　科目：輸送現象與單元操作　　本試題共 2 頁

本試題雙面印製

(1) (20%)

A simple problem encountered in heat-transfer and unit-operations texts is the one-dimensional transfer of heat through a solid wall as shown in Fig. 1. Set up the governing equation for this system, and find the solution.

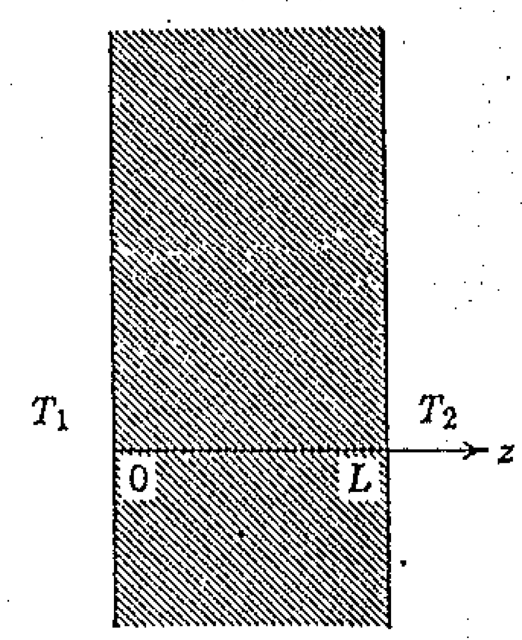

Fig. 1

(2) (20%)

A flow diagram of a reactor feed mixer and preheater is shown in Fig. 2. Calculate Q for this process. The kinetic energy and potential energy changes are assumed negligible, and no shaft work involved. ($\hat{H}$ is the specific enthalpy)

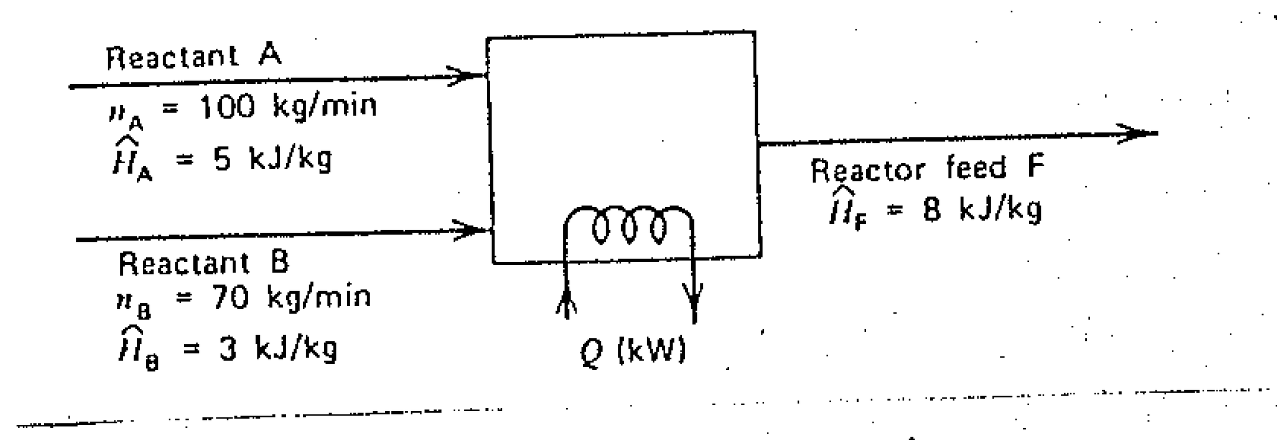

Fig. 2

(3)(20%)

The two tanks in Fig. 3 are connected through a mercury manometer. What is the relation between Δz and Δh?

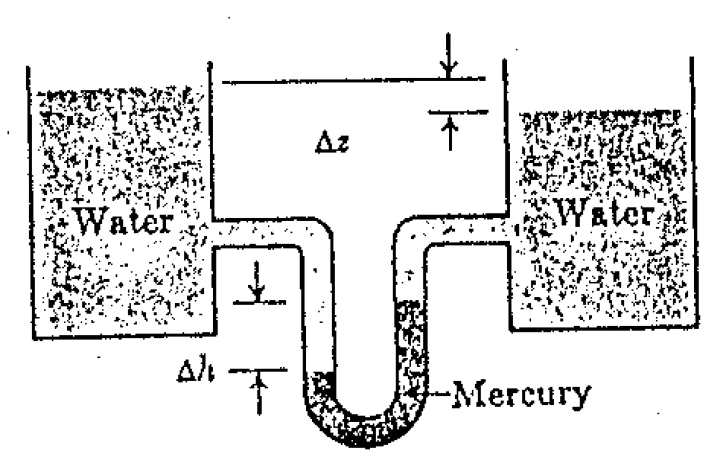

Fig. 3

◀ 注意背面尚有試題 ▶

本試題雙面印製

(4) (20%)
A constant-density newtonian fluid is flowing as a thin film down a vertical wall in laminar flow; see Fig. 4. Find the velocity distribution and volumetric flow rate per unit width of wall by using the Navier-Sokes equation (z component) on the assumptions that there is no flow in the x or y directions, that the z component of the velocity is zero at the solid wall, that there is no shear stress at the liquid-air surface, and that the flow is steady-state.

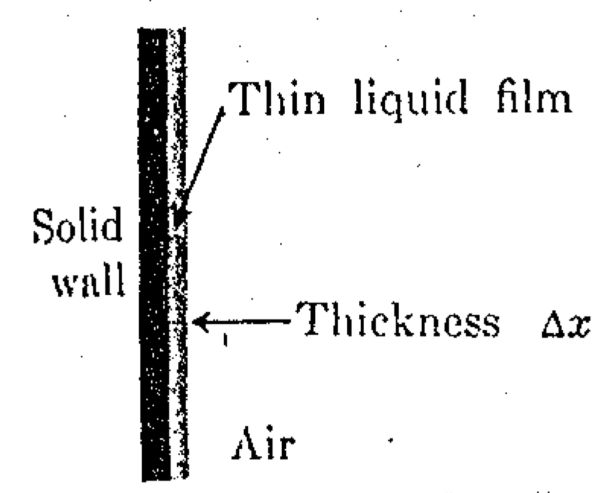

Fig. 4

(5) (20%)
An incompressible fluid is flowing in a horizonal tube of circular cross section with radius R and length L (Fig. 5). The tube wall is maintained at a constant temperature T_w, and the inlet fluid is at temperature T_i. We assume the velocity profile at the entrance is fully developed, that is, it has reached the steady state profile by passing through an entrance region. The problem is to set up the steady-state simplified momentum ans energy balances that can serve as the model for the process. Develop the governing differential equations for this system and specify the boundary conditions.

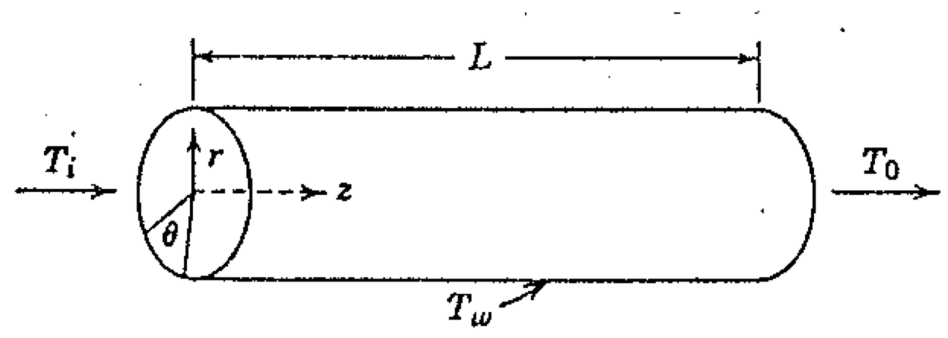

Fig. 5