

淡江大學 107 學年度日間部轉學生招生考試試題

系別：航空太空工程學系三年級

科目：流體力學

65-1

考試日期：7月27日(星期五) 第3節

本試題共 8 大題， 1 頁

簡答題：

1. Give two examples that fall in the subject of fluid statics? Give three examples that fall in the subject of fluid dynamics? (10 分)
2. What is "integral approach"? What kind of equation is obtained? (4 分)
3. What is "absolute pressure"? What is "gage pressure"? (6 分)
4. What is "model test" for? What is "incomplete similarity"? (20 分)
5. What is the flow behavior in the entrance region of a pipe flow? What is "fully developed flow"? (15 分)
6. What is "boundary layer thickness"? Why do we define "displacement thickness" in the study of boundary layer problem? (10 分)

計算題：

7. A tank of 0.05 m^3 volume contains air at 800 kPa (absolute) and 15°C (Figure 1). At $t=0$, air escapes from the tank through a valve with a flow area of 100 mm^2 . The air passing through the valve has a speed of 200 m/s , and a density of 5 kg/m^3 . Properties in the rest of the tank may be assumed uniform at each instant. Determine the instantaneous rate of change of density in the tank at $t=0$. (15 分) (hint: $\frac{\partial}{\partial t} \iiint \rho dV + \iint \rho \vec{v} \cdot d\vec{A} = 0$)
8. A metal container 0.6 m high, with an inside cross-sectional area of 0.1 m^2 , has a mass of 2 kg when empty (Figure 2). The container is placed on a scale and water flows in through an opening of area 0.01 m^2 in the top with velocity of 1 m/s , and out through the two equal area openings in the sides. Under steady flow conditions, the height of the water in the tank is 0.5 m . Determine the reading on the scale. Assume the gravitational acceleration is 10 m/s^2 , density of water is 1000 kg/m^3 . (20 分) (Hint: $\vec{F}_s + \vec{F}_B = \frac{\partial}{\partial t} \iiint \vec{v} \rho dV + \iint \vec{v} \rho \vec{v} \cdot d\vec{A}$)

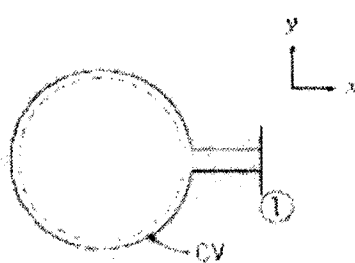


Figure 1

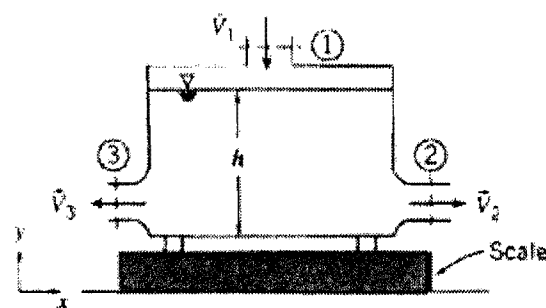


Figure 2