

# 淡江大學 101 學年度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

考試日期：7 月 17 日(星期二) 第 3 節

本試題共 5 大題， 1 頁

1. 簡答題，共 20%，每小題 5%：

- (a) 如果  $\phi$  是 velocity potential，請問  $\partial^2 \phi / \partial y^2$  的單位(公制)是甚麼？
- (b) 請問甚麼是 potential flow，其定義為何？
- (c) 請說明 streamline 與 pathline 的異同
- (d) 請問 Bernoulli's 方程式在何種流場條件下方可使用？

2. The equation of the stream function for a 2-D flow is given by

$$\psi = (x^2/2) + xy = C$$

where C is a constant. Determine the velocity of a fluid particle at point (2, 3). (20%)

3. In a 2-D incompressible flow, the x component of velocity is given by  $u = 3x^2 - y$ . On the x-axis, the y-component of velocity is given by  $v = 2/x$ . Please find the expression for v. (20%)

4. In a 2-D incompressible flow, the velocity is given as

$$\mathbf{V} = (y^3/3 + 2x - x^2y)\mathbf{i} + (xy^2 - 2y - x^2/3)\mathbf{j}$$

Please check whether this flow field represents an irrotational flow. (20%)

5. For a 2-D incompressible flow with velocity potential  $\phi$  given as  $\phi = x^2 - 2y^2$ . Please find the pressure difference between (3, 2) and (5, -1). (20%)