

淡江大學 106 學年度日間部寒假轉學生招生考試試題

44-1

系別：航空太空工程學系三年級

科目：流體力學

考試日期：1月6日(星期六) 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 ϕ 是 velocity potential，請問 $\partial\phi / \partial y$ 代表的是甚麼物理量？
- (b) 請問流場內必須滿足何種條件，才能說兩個流場是動態相似(dynamic similar)，？
- (c) 請說明 streamline 的定義
- (d) 請問若 $p(x, y)$ 為壓力分佈，請問 ∇p 之數學運算式如何表示？

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

$$\psi = 3x^2 + 2xy$$

Determine the velocity of a fluid particle at point (4, 1). (20%)

3. A 2-D incompressible flow has the velocity field: $V = x \mathbf{i} - (3x+y) \mathbf{j}$. Does it satisfy the equation of continuity? Please prove it! (20%)

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

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

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

5. For a 2-D incompressible flow with velocity potential ϕ given as $\phi = xy^2 - 2yx^2$. Please find the pressure difference between (2, 1) and (4, -2). (20%)