

# 國立中山大學 107 學年度碩士暨碩士專班招生考試試題

科目名稱：流體力學【海科系碩士班乙組選考】

題號：458003

※本科目依簡章規定「不可以」使用計算機(問答申論題)

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## 一、解釋名詞(每小題 5 分，共計 50 分)

1. stagnation point
2. cavitation
3. Froude number
4. pitot tube
5. dynamic similarity
6. Mach number
7. ideal fluid
8. Coriolis acceleration
9. potential flow
10. Moody chart

## 二、計算題(每小題 10 分，共計 50 分)

1. Write the Navier-Stokes equation of an incompressible viscous flow and explain the meaning of each term in the equation.
2. At a certain location the ocean current speed is 2 m/s. Determine the actual power generation potential of a turbine with a blade diameter of 50 m at that site, assuming an overall efficiency of 30%. Take the seawater density to be  $1025 \text{ kg/m}^3$ .
3. 一連續、不可壓縮流體在穩態時的速度場為  $\vec{V}(u, v, w) = u\vec{i} + v\vec{j} + w\vec{k}$   
，其中： $u = x^2 + 2y + 3z$   
 $v = xy + y^2 + z$   
請求出其中的分量  $w$ 。
4. The drag force,  $F$ , on a smooth sphere depends on the relative velocity,  $V$ , the sphere diameter,  $D$ , the fluid density,  $\rho$ , and the fluid viscosity,  $\mu$ . Obtain a set of dimensionless groups that can be used to correlate experimental data.
5. Water is flowing in an open channel at depth of 2.5 m and a velocity of 2 m/s. Then it flows down a contracting chute into another channel, with the depth and the velocity being 1 m and 10 m/s, respectively. Assume frictionless flow, determine the difference in elevation of the channel floors.