1. Explain the following terms: (20%)

   - Reynolds number
   - Mach number
   - Euler's method
   - Lagrangian's method

   Please include relevant formulae/equations in your answers.

2. Please give an example in everyday life that can be described by Bernoulli's equation, and explain why. (20%)

3. Please explain the physical meanings of the equations of mass, momentum and energy. You also need to explain the meaning of each term in the equations. (20%)

4. A two-dimensional velocity field $\vec{U}$ can be described as follows:

   $$\vec{U} = u\hat{i} + v\hat{j} = 2xy\ \hat{i} + (x^2 - y^2)\ \hat{j}$$

   Please calculate the following:

   - Velocity potential (10%)
   - Stream function (10%)

5. Explain whether the following velocity field is a divergent flow or rotational flow or neither: (20%)

   $$\vec{U} = u\hat{i} + v\hat{j} = 4(xy + y^2)\hat{i} + 2(x^2 - y^2)\hat{j}$$

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