

10. Description of 2D flow

20. December 2023

Problem 1.

Find the stream functions for the following stream functions. Test whether the velocities correspond to a potential flow and the fields are incompressible.

$$\psi_1 = Axy, \quad \psi_2 = A(x^2 - y^2).$$

Problem 2.

For the following fields, find the stream function and the velocity potential:

a) Couette flow: Flow between two infinitely long horizontal plates with distance h . One of them is moving with velocity U and the second one is stationary. The velocity of the Couette flow is

$$u = U\frac{y}{h}, \quad v = 0.$$

b) Velocity field

$$u = A(x^2 - y^2), \quad v = -2Axy,$$

where A is a constant.