

Hydrodynamics
Homework 1: Helmholtz decomposition
X. October 2023

Exercise:

Find a scalar and velocity potential ϕ and \mathbf{A} for the vector field $\mathbf{u} = (-y^2, x, 0)$, so that

$$\mathbf{u} = \nabla\phi + \nabla \times \mathbf{A}$$

inside a bounded subdomain in \mathbb{R}^3 .