Oct 19th, 2026

HOMEWORK-4

(Submit it at the start of the next lecture, 26 Oct 2026)

The velocity potential for an incompressible, inviscid, irrotational flow over a circular cylinder is governed by Laplace's equation.Write Laplace's equation in polar coordinates. Write a computer program that numerically solves this equation for the velocity potential in the flow field around the cylinder. Plot the velocity potential as a function of radial distance away from the cylinder, at several angular positions. Calculate and plot the pressure coefficient distribution along the surface of the cylinder. Finally, compare all these numerical results with exact results from the classical analytical solution for the flow over a cylinder.

Hint: Use second order, partial differences to solve Laplace. Use relaxation technique.

NOTE: The report should be concise and should not exceed **10 pages**, excluding the source code.