

2D Channel Flow Around a Cylinder Using MOLE



Flow past a circular cylinder is a standard benchmark in computational fluid dynamics for assessing numerical accuracy, convergence, and stability. We solve the two-dimensional incompressible Navier–Stokes equations using the MOLE library with the projection method for pressure–velocity coupling. MOLE applies higher-order mimetic divergence, gradient, and Laplacian operators on structured grids and efficiently interpolates variables on staggered grids, enhancing stability and conservation. Simulations with uniform inflow and no-slip boundary conditions on the cylinder capture boundary layer development, flow separation, and periodic von Kármán vortex shedding. Key metrics agree with existing literature, confirming the solver’s correctness and robustness.

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This research is supported by the University of CA, Irvine and the Computational Science Research Center (CSRC) at San Diego State University

