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Simulating incompressible flow on moving meshfree grids using General Finite Differences (GFD)[1] YAROSLAV VASYLIV, ALEXANDER ALEXEEV, Georgia Institute of Technology — We simulate incompressible flow around an oscillating cylinder at different Reynolds numbers using General Finite Differences (GFD) on a meshfree grid. We evolve the meshfree grid by treating each grid node as a particle. To compute velocities and accelerations, we consider the particles at a particular instance as Eulerian observation points. The incompressible Navier-Stokes equations are directly discretized using GFD with boundary conditions enforced using a sharp interface treatment. Cloud sizes are set such that the local approximations use only 16 neighbors. To enforce incompressibility, we apply a semi-implicit approximate projection method. To prevent overlapping particles and formation of voids in the grid, we propose a particle regularization scheme based on a local minimization principle. We validate the GFD results for an oscillating cylinder against the lattice Boltzmann method and find good agreement.

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