Numerical simulation of Stokes flow around particles via a hybrid Finite Difference-Boundary Integral scheme AMITABH BHATTACHARYA, Indian Institute of Technology, Bombay, Mumbai — An efficient algorithm for simulating Stokes flow around particles is presented here, in which a second order Finite Difference method (FDM) is coupled to a Boundary Integral method (BIM). This method utilizes the strong points of FDM (i.e. localized stencil) and BIM (i.e. accurate representation of particle surface). Specifically, in each iteration, the flow field away from the particles is solved on a Cartesian FDM grid, while the traction on the particle surface (given the the velocity of the particle) is solved using BIM. The two schemes are coupled by matching the solution in an intermediate region between the particle and surrounding fluid. We validate this method by solving for flow around an array of cylinders, and find good agreement with Hasimoto's (J. Fluid Mech. 1959) analytical results.

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