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Particle Dynamics in Rotating Flow inside Coaxial Cylinder ALBERT S. KIM, University of Hawaii at Manoa, SUNGSU LEE, Chungbuk National University — In this study, trajectory and distribution of unequal-sized particles in a coaxial cylinder are investigated using dissipative hydrodynamics (DHD), an updated version of Stokesian dynamics. Flow field is established by rotating an inner cylinder in a fixed outer cylinder. Initially, particles are randomly released in the flow. The flow field is then decomposed into unidirectional flow, vortice and rate-of-strain at particle centers. Translation and rotation of particles are accurately mimicked using the fourth-rank hydrodynamic tensors. In general, far-field many-body grand mobility matrix was formed at each time step as a function of particle positions, and inverted to calculate the grand resistance matrix. The Langevin equation is directly solved to trace the particle trajectory using the intermediate time step to physically mimic influence of force and torque. Particle inertia is intrinsically included as rotational fluid speed increases from the surface of the inner cylinder to that of the outer cylinder. Optimal operation conditions to separate particles due to size differences are suggested by DHD simulation results. This work was financially supported by projects of the "Development of Energy utilization technology with Deep Ocean Water," KIOST of Korea.

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