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Irreversibility of shear flow carrying solid particles PETER VOROBIEFF, MARC INGBER, ANDREA MAMMOLI, The University of New Mexico, TODD MCCOLLAM, Armament Research, Development, and Engineering Center — We present an experimental and numerical study of a low-Reynolds number flow in a wide-gap Couette device. Five spheres are placed into the device in a tightly packed arrangement. The inner cylinder is rotated five revolutions counterclockwise and subsequently five revolutions clockwise to assess the irreversibilities introduced into the system by particle interaction. The experimental results are compared to numerical simulations performed with a lubrication-correctly completed double layer boundary element method with a particle roughness model. The quantitative measure of irreversibility we use for comparison is based on the radial spread of the particles. If the particle roughness in simulations is adjusted to best match the experiments, a good agreement is achieved. However, the roughness value producing the best agreement is appreciably different from the measured average roughness value of the particles used in experiment.

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