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Hydrodynamic particle interactions in sheared microflows ALVARO MARIN, MASSIMILIANO ROSSI, Institute of Fluid Mechanics and Aerodynamics, Bundeswehr University Munich, MAURICIO ZURITA-GOTOR, Abengoa Research, Sevilla, Spain, CHRISTIAN J. KÄHLER, Institute of Fluid Mechanics and Aerodynamics, Bundeswehr University Munich — Multiphase flows in microconfined geometries are non-trivial problems: drops and particles introduce a high degree of complexity into the otherwise linear Stokes flows. Very recently, new mechanisms of instability have been identified in simulations in shear-flows of non-Brownian particle solutions (Zurita-Gotor et al., J. Fluid Mech. 592, 2007, and Phys. Rev. Lett. 108, 2012), which might be the cause for anomalous self-diffusion measured experimentally by Zarraga and Leighton (Phys. Fluids 14, 2002). Using a 3D particle tracking technique (Astigmatism-PTV), we perform experiments in a microconfined cone-plate couette flow with a dilute suspension of non-brownian particles. The A-PTV technique permits us to track individual particles trajectories revealing particle-particle hydrodynamic interactions. Our experiments show an abnormal dispersion in the velocity field and non-homogeneous particle distribution which can be related with the swapping mechanism (JFM 592, 2007;PRL 108, 2012).

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