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Anomalous diffusion of non-colloidal suspensions in a Couette flow KYONGMIN YEO, MARTIN R. MAXEY, Division of Applied Mathematics, Brown University — The effects of wall-confinement on the dynamics and particle migration within concentrated non-colloidal suspensions in a Couette flow are investigated. We focus mainly on the shear-induced self-diffusion at 40% volume fraction. The channel is divided into four zones depending on suspension microstructures and variances of the wall-normal and spanwise displacements for the particles in each zones are studied. Due to the strong spatial coherency, the suspended particles exhibit anomalous diffusion in the wall-normal direction. The diffusive behavior changes from superdiffusion for the particles next to the wall to subdiffusion for the particles near the core of the channel. The results indicate that the intermittent jumps and particle entrapment in particle layers are responsible for the anomalous diffusion near thewall, while the subdiffusion in the core is related with the restriction on the available lengthscale by the size of confinement. Diffusive behaviors of the particles in the core of the channel for four different volume fractions (25%, 30%, 35%, and 40%) are compared. For a channel of height $20D$, where D is the particle diameter, the regular diffusive behavior in the core is observed for the volume fraction 40%.

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