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An investigation of mixing ratio effects on a Couette cell granular flow using magnetic particle tracking method[1] XINGTIAN TAO, HUIXUAN WU, UNIVERSITY OF KANSAS — Optical based methods are abundant in flow measurements; however, they can hardly be used in opaque environment. Therefore, a non-optical based particle tracking method — Magnetic Particle Tracking (MPT) —is investigated and three algorithms of data processing are analyzed. These algorithms are sequential quadratic program, extended Kalman filter (EKF), and particle filter. The reconstructed position and orientation of the magnetic tracer is compared with high-speed camera image result, and the accuracy of MPT with EKF algorithm is in the order of 0.6% in position and 1.5 degree in orientation. This technique is applied to study a sheared dense granular mixture in a Couette cell. The mixture comprises of spheres and cylinders (aspect ratio equals to 1). The trajectory and angle alignment of the tracer particle is reconstructed, and its distribution in the Couette cell is depicted. The effect of the mixing ratio on this Couette cell system is characterized by using finite time Lyapunov exponent between neighboring trajectories.

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