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Measurement of hydrodynamic forces on near-contact droplets[1]

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Collisions between particles in turbulent flows are important in many natural and industrial processes, including rainfall and combustion. Though three-dimensional particle tracking is used routinely to measure the motions of fluid, detection of collisions between particles has been limited to non-automated methods due to the difficulty of differentiating between particles as they come close together. Near contact, particle pairs may experience forces that arise from interactions between the background flow and the motion of the two particles, and these forces may tend to promote or prevent collision. In our experiment, we observe water droplets ranging from 10 microns to 100s of microns in radius. We present measurements of the hydrodynamic interactions between droplets at separations of less than one diameter using an in-house particle tracking algorithm that resolves trajectories approaching and including contact.

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