Abstract Submitted
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Life in the fast layer ERNEST B. VAN DER WEE, Department of Physics & Astronomy, Northwestern University, BRENNAN SPRINKLE, Courant Institute of Mathematical Sciences, New York University, ISAIAH KATZ, Department of Physics & Astronomy, Northwestern University, MENA YOUSSEF, STEFANO SACANNA, Department of Chemistry, New York University, ALEKSANDAR DONEV, Courant Institute of Mathematical Sciences, New York University, MICHELLE M. DRISCOLL, Department of Physics & Astronomy, Northwestern University — Microrollers are rotating particles that become active close to a wall due to an asymmetric flow of the fluid around the particles. They can be experimentally realized by driving magnetic colloidal particles hovering above a wall with a rotating magnetic field. Introducing a small fraction of fluorescently labeled microrollers, we can measure their velocities using microscopy and particle tracking. We compare our results to high resolution Brownian dynamics simulations which include lubrication effects. The velocity of a microroller is much slower than the velocity of the fluid pumped around it. Therefore, a particle put in the flow field around a microroller will have a velocity much higher than the microroller itself. As a consequence, the average velocity of a suspension of microrollers increases as a function of their density. In addition, at higher densities the particles form two layers: a slow one close to the wall and a much faster one above it. We find that the microrollers switching between the slow and the fast layer, and characterize the lifetime of the particles in the two layers.

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