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Mutual Capture Of Two Charged Particles Settling Under Gravity In A Viscous Fluid¹ CHRISTOPHER TROMBLEY, MARIA EKIEL-JEZEWSKA, Institute of Fundamental Technological Research, Polish Academy of Sciences — Interacting particles in a fluid are said to capture each other if their relative orbits are bounded. Such particle capture in a fluid is a topic of interest in both theory and application. One important feature of the global dynamics is the size of the set of all initial conditions in which two particles capture each other, especially as parameterized by physical ratios such as particle radii and densities. We explore this problem for a pair of charged point particles settling under gravity in a Stokes flow. Having previously demonstrated that vertical stable stationary states are possible, we now also find a family of inclined stable stationary states. We demonstrate how a vertical non-stable stationary state is essential for establishing the size of the capturing set. We show that for a region in the parameter space of the ratios of the particle radii & densities, and of electrostatic to gravitational forces, the capturing set of particle relative positions is large compared to their radii.

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