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The Hydrodynamic Coupling of Two Rotating Micro-objects LIANGYU ZHOU, YAFEI WANG, TAO ZHANG, GANG HU, Hong Kong Baptist University — We applied emulsification techniques to encapsulate a micro- sized, optically anisotropic particle inside a liquid droplet, which is in turn freely suspended in another fluid. Using optical tweezers, we have demonstrated the trapping and rotating of the internal particle by radiation force and torque. The particle-filled liquid droplet can execute a constant rotation motion due to hydrodynamic transport from the rotating particle, and the internal flow is also coupled out of the liquid droplet. In addition, the suspended liquid droplet may show a complex rotational motion depending on the configurations of the two rotating objects even though the fluid flow is in a low Reynolds number regime. We measured the ratio of rotational speeds versus the size ratio of two rotating objects and studied experimentally the stability of the droplet rotation when the relative position of the trapped particle is varied. Further theoretical and numerical work is needed to fully understand the effects of hydrodynamic interaction.

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