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Taylor-Couette flows with radial fluid injection during co- and counter- rotation, for controlled mixing applications. NIKOLAS WILKINSON, CARI DUTCHER, University of Minnesota - Twin Cities — Flow between rotating concentric cylinders, called Taylor-Couette (TC) flow, offers high control over hydrodynamics, making TC flow ideal to study mixing. However, traditional TC cell design limits the ability to study the initial solution mixing dynamics while the cell is operating, due to geometric confinement and complexity when both cylinders are rotating. Here, we present a new TC cell design that allows for radial injection of fluids into the annulus while both cylinders are rotating. This Taylor-Couette cell has radius ratio of Ri/Ro = 0.89, an aspect ratio of L/d = 60 with 16 injection ports, and allows for both cylinders to rotate simultaneously and independently. With this geometry, we discuss how the injection port modification effects flow instabilities, as well as how radial injection during cylinder rotation modifies the flow. In our current work, we are studying flocculation of micron clay particles with polyelectrolyte solutions and how the hydrodynamics effects assembly and structure of these materials during the flocculation process.

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