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Effect of Inertial Migration of Particles on Hysteresis in Suspension TaylorCouette Flow LINA BAROUDI, CLAUDIA BERNHARDT, Manhattan College, MADHU MAJJI, Massachusetts Institute of Technology, JEFFREY MORRIS, CUNY City College of New York — In this work, we present an experimental investigation into the influence of inertial migration of particles on flow transitions of a suspension in Taylor-Couette geometry with a stationary outer cylinder and rotating inner cylinder. This was considered for neutrally buoyant particles of size $d_p = 230$ μm in the circular Couette flow (CCF) and Taylor vortex flow (TVF) states of a suspension at a concentration of $\phi = 0.10$. While the effect of suspended particles on inertial flow transitions was recently investigated [Majji *et al.* (JFM 835, 936 (2018)), Ramesh *et al.* (JFM 870, 901 (2019)], the role of inertial migration of particles on flow transitions and observed flow structures has not been established for Taylor-Couette flow. This study considers the hysteresis effects associated with particles by focusing on the influence of non-uniform particle distribution due to particle migration in the CCF and TVF on flow transitions away from these initial states, relative to the case with uniform particle distribution, when the Reynolds number is rapidly changed. Clear evidence of the role of inertial migration and the resulting nonuniform particle fraction in the hysteretic behavior is established by our work.

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