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Angular momentum transport and flow super-rotation in Rayleigh stable Taylor-Couette FREJA NORDSIEK, University of Maryland at College Park, SANDER HUISMAN, ROELAND VAN DER VEEN, CHAO SUN, DETLEF LOHSE, Physics of Fluids group, University of Twente, Netherlands, DANIEL LATHROP, University of Maryland at College Park — We present experimental velocimetry and torque measurements for Taylor-Couette flow in the Rayleigh stable regime. Measurements are taken on two geometrically similar experiments, both of which had axial boundaries attatched to the outer cylinder, which is known to cause Ekman pumping. The Twente experiment has a radius ratio of 0.716, an aspect ratio of 11.68, and measures azimuthal velocities by Laser Doppler Anenometry. The Maryland experiment has a radius ratio of 0.725, an aspect ratio of 11.47, and measures the torque required to rotate the inner cylinder. The torque on the inner cylinder is observed to be greater than that of the analytical Couette profile and has a complex dependence on the Reynolds number and Ω_i/Ω_o. The azimuthal velocity profiles also deviate from the laminar Couette profile. Signficantly, super-rotation in the angular velocity has been observed for $1 > \Omega_i/\Omega_o > 0$. In the quasi-Keplerian regime, the angular momentum profiles consist of an approximately constant inner region connected to an outer region approximately in solid-body rotation at Ω_o, which suggests that angular momentum is being actively transported from the inner region to the axial boundaries.

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