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Exploring the phase space of multiple states in highly turbulent Taylor-Couette flow ROELAND VAN DER VEEN, SANDER HUISMAN, ON YU DUNG, HO LUN TANG, CHAO SUN, DETLEF LOHSE, University of Twente — It was recently found that multiple turbulent states exist for large Reynolds number ($\mathrm{Re} = 10^6$) Taylor-Couette flow in the regime of ultimate turbulence. Here we investigate how the transitions between the multiple states depend on the Reynolds number in the range of $\mathrm{Re} = 10^5$ to $2 \cdot 10^6$, by measuring global torque and local velocity while probing the phase space spanned by the rotation rates of the inner and outer cylinder. This sheds light on the question whether multiple states persist for Reynolds numbers beyond those currently reached. By mapping the flow structures for various rotation ratios in two Taylor-Couette setups with equal radius ratio but different aspect ratio, we furthermore investigate the influence of aspect ratio on the characteristics of the multiple states.

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