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An Instability in Stratified Taylor-Couette Flow¹

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In the late 1950s Russell Donnelly began conducting experiments at the University of Chicago on flow between concentric rotating cylinders, and his experiments together with complementary theory by his collaborator S. Chandrasekhar (*Hydrodynamic and Hydromagnetic Stability*, Clarendon Press, 1961) did much to rekindle interest in the flow instability discovered and studied by G.I. Taylor (1923). The present study concerns an instability in a concentric cylinder system containing a fluid with an axial density gradient. In 2005 Dubrulle et al. suggested that a ‘stratorotational instability’ (SRI) in this system could provide insight into instability and angular momentum transport in astrophysical accretion disks (*Astron. Astrophys.* **429**, 429). In 2007 the stratorotational instability was observed in experiments by Le Bars and Le Gal (*Phys. Rev. Lett.* **99**, 064502). We have conducted an experiment on the SRI in a concentric cylinder system (radius ratio $\eta = 0.876$) with buoyancy frequency $N/2\pi = 0.25, 0.50, \text{ or } 0.75$ Hz. For $N = 0.75$ Hz we observe the SRI onset to occur for $\Omega_{outer}/\Omega_{inner} > \eta$, contrary to the prediction of Shalybkov and Rüdiger (*Astron. Astrophys.* **438**, 411, 2005).

¹Research conducted with Bruce Rodenborn and Ruy Ibanez