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An Anomaly in the Domain Chaos State of Rayleigh-Bénard Convection with Large Aspect Ratio NATHAN BECKER, GUENTER AHLERS, UC Santa Barbara — Rayleigh-Bénard convection-patterns exhibit a type of spatio-temporal chaos known as domain chaos (DC) at the onset of convection when the sample rotates fast enough about the vertical axis. DC is characterized by domains of straight rolls that chaotically change their orientation and size due to the Küppers-Lortz instability.[1] However, in a large aspect ratio $\Gamma \equiv r/d = 82$ cylindrical sample, where r is the radius of the cell and d is the cell thickness, we observed DC in the sample center, surrounded by an annulus of radial rolls populated by occasional defects reminiscent of undulation chaos.[2] This was unexpected because smaller samples do exhibit domain chaos throughout and the weakly-nonlinear theory that describes the supercritical bifurcation to chaos is expected to be more applicable as Γ increases. One possible explanation is that the centrifugal force, which is neglected in the theory, plays an important role.[3]

[1]G. Küppers and D. Lortz, J. Fluid Mech. **35**, 609 (1969).
[2]K. E. Daniels, B.B. Plapp, and E. Bodenschatz, Phys. Rev. Lett. **84**, 5320 (2000).
[3]A. Jayaraman and H. Greenside (private communication).

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