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Aspect-ratio dependence of the large-scale circulation in Rayleigh-Bénard convection with weak rotation[1] GUENTER AHLERS, Department of Physics, UCSB, PING WEI, School of Aerospace engineering and applied mechanics, Tongji U, Shanghai, China — We report measurements for slowly rotating turbulent thermal convection in cylindrical samples with aspect ratios $\Gamma = 1.0$ and 2.0 for a Prandtl number $Pr = 12.3$. The results are for the large-scale circulation (LSC) strength δ, Fourier-energy E_{tot}, and relative flow strength S, as well as for two Reynolds numbers Re_{ret} and Re_{sl}, for the Nusselt number Nu, and for the vertical temperature gradient $\partial\Theta/\partial z$ at the sample center. They cover the Rayleigh-number range $3 \times 10^{10} \leq Ra \leq 4 \times 10^{11}$ and the inverse Rossby-number range $0 \leq 1/Ro \leq 1/Ro_c$. Nu, E_{tot}, S, and $\partial\Theta/\partial z$ showed sharp transitions at $1/Ro_c$. The LSC underwent retrograde rotation with period τ_{ret} and showed sloshing oscillations with period $\tau_{sl} << \tau_{ret}$. At constant Ra and $1/Ro$ δ grew and decayed with a period equal to τ_{ret}. We found that $Re_{ret} \equiv 4L^2/\tau_{ret}\nu \propto Ra^{0.65}$ ($\propto Ra^{0.50}$) for $\Gamma = 1.0$ ($\Gamma = 2.0$) (ν is the kinematic viscosity and L the sample height) and $Re_{sl} \equiv 4L^2/\tau_{sl}\nu \propto Ra^{0.50}$ ($\propto Ra^{0.42}$) for $\Gamma = 1.0$ ($\Gamma = 2.0$).

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