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Large-scale-circulation dynamics of turbulent Rayleigh-Benard convection in a cubic container KUNLUN BAI, DANDAN JI, ERIC BROWN, Department of Mechanical Engineering and Materials Science, Yale University — We present measurements of the large-scale-circulation (LSC) in turbulent Rayleigh-Benard convection in a cubic container. The experiments cover the Rayleigh number ranging from 0.5×10^9 to 3×10^9 at Prandtl number 6.4. Using three rows of thermistors at different height of the container, the large-scale-circulation (LSC) can then be identified. It is found that the LSC prefers to lock at the corners of the container, and switches between them stochastically. The strength of LSC keeps as a constant during the switching which suggests those switching correspond to fluctuation driven crossings of a potential barrier in θ due to the side wall geometry as predicted by Brown and Ahlers (Phys. Fluids, 2008). The switching frequency is found to decrease as Ra increases. The measured LSC orientation and its switching will be compared to the model which predicts the effects of container geometry on large-scale coherent structure dynamics for arbitrary geometry.

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