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Small scale properties of Rayleigh Benard convection in confined space[1] KAI-LEONG CHONG, MATTHIAS KACZOROWSKI, KE-QING XIA, Department of Physics, The Chinese University of Hong Kong, Shatin — We report a direct numerical simulation (DNS) study on small scale properties of turbulent Rayleigh Benard convection (RBC) in highly confined configurations. Our simulations span a wide range of Rayleigh number (from 10^7 to 10^{10}) at Pr=0.7 and Pr=4.38. It is found that the cell's smallest dimension, characterized by the aspect ratio, introduces a cut off for the local Bolgiano length scale (evaluated in the bulk of the cell). This result may provide an opportunity for studying the cascade processes in the RBC system through a simply geometrical confinement. Another finding of the study is that the change in flow topology induced by confinement (decreasing aspect ratio) leads to more plumes entering the bulk, thus increasing the velocity and temperature fluctuations in the bulk until the merging of viscous and thermal boundary layers from sidewalls.

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