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Aspect ratio dependence of heat transport in Rayleigh-Bénard convection[1] MOHAMMAD EMRAN, JORGE BAILON-CUBA, JOERG SCHUMACHER, Technische Universitaet Ilmenau, Germany — The variation of heat transfer with respect to two of the three dimensionless control parameters in confined convection, namely the Rayleigh number and Prandtl number, has been the focus of most experiments and simulations. The dependence of the third parameter- the aspect ratio $\Gamma = D/H$, with D is the diameter and H is the height of the cell- has, however, been studied little. We, therefore, want to investigate the aspect ratio dependence of convective turbulence in a cylindrical cell by three-dimensional direct numerical simulations. The study emphasizes on two questions: Does the turbulent heat transport at a fixed Rayleigh number Ra depend on the aspect ratio variation? Which changes in the global flow structures are associated with the aspect ratio variation? The analysis is conducted at several Ra with a fixed Prandtl number of 0.7. In addition, we quantify the fraction of the total kinetic energy that is contained in large-scale flow patterns by the so-called snapshot analysis.

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