The Effect of Horizontal Buoyancy on Turbulent Thermal Convection[1] LU ZHANG, KE-QING XIA, Southern University of Science and Technology; The Chinese University of Hong Kong — We study the effect of horizontal buoyancy on heat transport in turbulent thermal convection system. Experimentally, a condition of increasing horizontal buoyancy ($Ra_H = \alpha g \sin\beta \Delta H^3 / \nu\kappa$) under fixed vertical thermal driving strength ($Ra_V = \alpha g \cos\beta \Delta H^3 / \nu\kappa$) is achieved by simultaneously titling the convection cell by an angle β and increasing the imposed global temperature difference Δ. Furthermore, we propose a vector formed Nusselt number $\boldsymbol{Nu}$ to quantify the global heat transport. For fixed vertical buoyancy, we find that the vertical heat transport increase monotonically with the horizontal buoyancy and the horizontal heat transport is also non-negligible. We also conduct direct numerical simulations, the results of which confirm our experimental findings and highlights the richness in convective transport.

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