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Measured oscillations of the velocity and temperature fields in turbulent Rayleigh-Bénard convection in a rectangular cell[1] SHENG-QI ZHOU, CHAO SUN, KE-QING XIA, Dept. of Physics, The Chinese University of Hong Kong — We report experimental measurements of the velocity and temperature oscillations in a rectangular cell. The aspect ratios are $\Gamma_x = 1$ and $\Gamma_y = 1/4$ so that the large scale convective flow is confined in the plane of $\Gamma_x = 1$. From particle image velocimetry (PIV) measurement it is found that the large-scale flow plane aligns along the diagonal plane of the cell. The large scale circulation is found to be oscillatory based on analysis of the autocorrelation functions of the velocity and temperature fields. It is well known that oscillations of velocity and temperature exist in cylindrical cells. The fact that they are now also found in a rectangular cell suggests that the oscillation phenomenon is an intrinsic character of the convective flow rather than the geometric character of convection cell. In the range of Ra from 3.5×10^{10} to 9×10^{11}, it found that the oscillation frequency of temperature $f_T \sim Ra^{0.45}$ and that of the velocity $f_V \sim Ra^{0.51}$, which are close to results from previous measurements made in cylindrical cells.

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Sheng-Qi Zhou
Dept. of Physics, The Chinese University of Hong Kong

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