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Effect of non perfect thermal sources in turbulent thermal convection ROBERTO VERZICCO, DIMeG & CEMeC, Politecnico di Bari, Italy — The effects of the plates thermal properties on the heat transfer in thermal convection are investigated by direct numerical simulations of the Navier-Stokes equations with the Boussinesq approximation. It has been found that the governing parameter is the ratio of the thermal resistances of the fluid layer R_f and of the plates R_p; when this ratio is smaller than a threshold value ($R_f/R_p \approx 300$) the finite conductivity of the plates limits the heat transfer in the cell. In addition, since R_f decreases for increasing Rayleigh numbers, each experimental apparatus is characterized by a threshold Rayleigh number that can not be exceeded if the heat transfer in the cell has not to be influenced by the thermal properties of the plates. A model with a correction factor has been derived to account for the plates effects and it gave the appropriate correction for an experiment in which the heat transfer measurements were systematically smaller than a theoretical prediction. A recent experimental study has confirmed the present findings. Due to changes of the thermal plume dynamics caused by the locally reduced heat flux at the plate/fluid interface the plate effect can not be trivially corrected by accounting for the temperature drop at the plates.

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