

Large Eddy Simulations of Turbulent Thermal Convection at High Rayleigh Number

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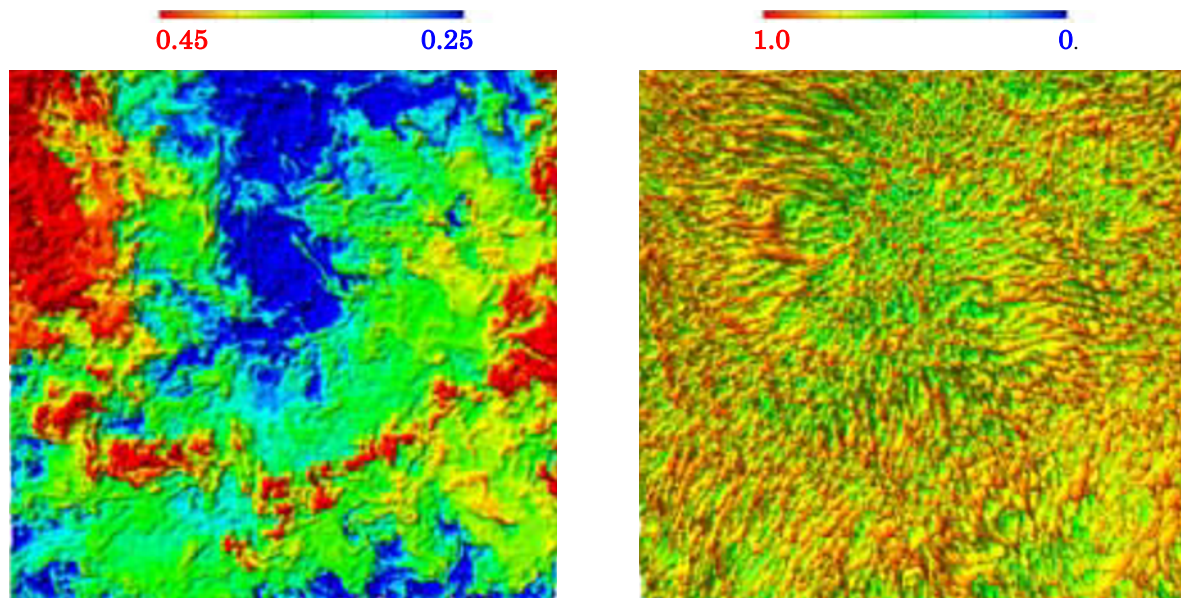


Fig. 1. Instantaneous temperature fields in the central vertical plane ($z/D=0.5$)-left and deeply inside thermal boundary layer ($z/D=0.001$)-right, for highly turbulent thermal convection of air between two infinite horizontal plates, $Ra=10^9$, $Pr=0.71$.

High resolution ($256 \times 256 \times 128$) large eddy simulations of thermal convection at high Rayleigh number ($Ra=10^9$) provided detailed insight into fluid flow, heat transfer and turbulence structure. The typical large coherent convective structures in form of the cell/roll pattern are observed in the central part of domain ($z/D=0.5$). These convective structures are replaced by so called 'planform' structures (very fine network of cellular like patterns) close to the thermally active walls ($z/D=0.001$, i.e. deeply inside thermal boundary layer).