

Interactions multi-échelles en convection de Rayleigh Bénard avec une plaque rugueuse

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Turbulent convection is a spontaneous physical process in natural environments and many industrial systems. However, most of these systems are not ideal in terms of underlying surfaces and involve specific topography or small-scale roughness. Interactions between plate roughness and nearby flow can induce changes in turbulence scales [1]. In addition, when the side walls of a cavity confine the flow or when it is enclosed by two large-scale horizontal walls, a large-scale circulation (LSC) is established in the fluid volume [2]. This work aims to reveal how the LSC changes small flow structures by considering either a cavity flow or a fluid layer of reduced size, particularly when a plate is rough.

This study considers three types of bottom plates: smooth plate and two plates with evenly distributed roughness elements. Three confined cavities and three periodic fluid domains are modeled using direct numerical simulations at constant Ra and P_r , considering the different types of plates as indicated above.

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