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# Growth of the temperature logarithmic layer in turbulent Rayleigh-Bénard convection

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## Résumé

The Rayleigh-Bénard convection is an ideal model of natural convection. The most prevalent structures in the fluid flow are the thermal plumes and the convection cell consisting in a descending cold jet and an ascending warm jet, connected by shearing regions along the upper and lower plates. The local shear is reduced where the jet forms (plume emitting region) and where the jet impacts the boundary layer (plume-impacting region). At very high Rayleigh numbers  $Ra$ , an inertial regime, often referred as the ultimate regime of convection, is expected. This regime is associated with a fully turbulent fluid flow, including in the boundary layers. More specifically, a temperature logarithmic profile is often assumed to derive the Nusselt scaling law in this regime. However, logarithmic temperature profiles have only been observed in the emitting region and do not necessarily imply a change in the global heat flux scaling. This study focuses on the thermal boundary layer and examines how the emergence of a temperature logarithmic profile could lead to an increase in the global heat flux. To this end, 3D numerical simulations are carried out in cavity for  $Ra$  ranging from  $2e9$  to  $1e12$ . A systematic study of the boundary layer has been applied to identify local logarithmic layers.

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