Abstract Submitted
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Roughness-triggered turbulent boundary layers in Rayleigh-Bnard convection[1] JULIEN SALORT, CNRS / ENS Lyon, OLIVIER LIOT, ENS Lyon, ROBERT KAISER, RONALD DU PUITS, TU Ilmenau, FRANCESCA CHILL, ENS Lyon — We present an analysis of the velocity fields in a Rayleigh-Bnard cell with a rough bottom plate. Beyond a critical Rayleigh number, the cell undergoes a transition towards a regime of enhanced heat transfer. The threshold is reached when the boundary layer thickness is smaller than the roughness size. We have obtained velocity fields using PIV near the obstacles, as well as the local heat-flux on the bottom plate. This has allowed us to test and improve our previous interpretation of the roughness-induced heat transfer enhancement mechanisms as a roughness-trigerred transition to turbulent boundary layers, see Salort, *et al.*, Phys. Fluids **26**, 015112 (2014). The velocity profiles on the top of the obstacle are indeed quite different above and below the transition. Below the transition, the profile is fairly compatible with profiles obtained in the smooth case. Above the transition, for $z^+ > 30$, the velocity profile is closer to the logarithmic profile that one would expect in the case of a turbulent boundary layer, and the slope is close to the classical value of 2.40. The offset however is slightly lower than the classical 5.84, as can be expected on a rough surface.

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