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Comparison between rough and smooth plates within the same Rayleigh-Benard cell ELEONORE RUSAOUEN, JULIEN SALORT, FANNY SEYCHELLES, JEAN-CHRISTOPHE TISSERAND, ENS Lyon, MATTHIEU CREYSSELS, LMFA, OLIVIER LIOT, BERNARD CASTAING, FRANCESCA CHILLA, ENS Lyon — A Rayleigh-Benard cell consist in a tank filled of a fluid on which a temperature difference is imposed thanks to a cold plate at top and a hot at bottom. Movement is induced by the buoyancy force. Considering most of experimental apparatus previously used all around the world, both plates are smooth. Recently, the effect of roughness on thermal transfer had become a subject of interest. The present experiment is an asymetrical rough Rayleigh-Benard cell. Indeed the hot plate is rough whereas the cold plate is still smooth. Previously, tests conducted with 2mm high roughness showed independence of the two plates and a heat flux enhancement on the rough plate, which appeared to be greater than expected from the surface increase. This regime was caracterized by a $Nu \propto Ra^{1/2}$ law. New results obtained with a 4mm high roughness also show this flux enhancement and the independent behaviour of the plates. But a transition appears at high Rayleigh from the 1/2 power law regime to a 1/3 one. Former results obtained in the same symetrical smooth/smooth cell also showed a 1/3 law. But the rough 1/3 regime reveals a multiplier coefficient of 1.6 with the smooth one.

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