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Heat transport in a tilted channel[1] XAVIER RIEDINGER, JEAN-CHRISTOPHE TISSERAND, FRANCESCA CHILLA, BERNARD CASTAING, ENS Lyon CNRS — We study heat convection in a channel between two chambers, the hot one being lower than the cold one. The channel is tilted with an angle varying up to 50 degrees and the power applied, to heat the hot chamber, varying up to 80 Watts. We perform both thermal and velocity measurements, through a PIV technique. We define a Nusselt number and a Rayleigh number according to the measured thermal gradient inside the channel. We show how increases the Nusselt number with the angle of the channel. Otherwise, the evolution of the thermal gradient shows four different regimes depending of the tilt angle and the power. When increasing power, the fluid flow changes from laminar to turbulent. For the turbulent case, we give a scaling law for the mean axial velocity. For intermediate parameters we differentiate another soft turbulent regime for which the velocity scaling law still apply but where the thermal gradient evolves much slowly with power. PIV measurements allow us to illustrate the transition from the laminar flow to the turbulent one and to distinguish a fourth regime charaterized by the destabilisation of laminar lateral jets.

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