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Mixed convection in a Rayleigh-Bénard cell with an imposed mean wind LAHCEN BOUHLALI, ANDREA SCAGLIARINI[1], HALLDÓR EINARSSON, ÁRMANN GYLFASON, School of Science and Engineering, Reykjavik University, Iceland, FEDERICO TOSCHI[2], Department of Mathematics and Computer Science, Eindhoven University of Technology, The Netherlands — Turbulent convection is present in a variety of natural occurring flows and engineering applications. In the most studied situation, the Rayleigh-Bénard (RB) setup, a fluid is confined between two differentially heated parallel plates under gravity. However, in many real-life situations, the picture can be complicated by flows interplaying/competing with the "natural" convection. In the atmosphere, for instance, thermal convection often coexists with currents due to pressure gradients. Buoyant and forced convection are also active in industrial flows (as in, e.g., heat exchangers). In this work we report a numerical study of a mixed convecting system. We consider a fully developed turbulent RB cell and at a given time we apply a constant pressure gradient, orthogonal to gravity. We will discuss the scaling properties of the heat flux with Rayleigh and friction Reynolds numbers as well as the statistics of small scale fluctuations of hydrodynamic fields. We will show that, depending on the relative ratio between buoyancy and pressure, the heat flux can be much depleted and the conductive profile for the temperature recovered. Such behaviour can be captured with simple phenomenological arguments. Comparisons with experimental results will be also presented.

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