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Turbulent Rayleigh-Bénard Convection with Conductive Plates RALF WITTENBERG, Simon Fraser University — Despite considerable experimental, theoretical and numerical effort, for turbulent Rayleigh-Bénard convection in the high-Ra limit the scaling of the enhanced bulk heat transport, measured by the Nusselt number Nu, with the temperature drop across the fluid, given by the Rayleigh number Ra, is still incompletely understood. While most work has assumed a fixed temperature drop across the fluid, it has recently become clear that this assumption is mathematically and experimentally inadequate, and in the quest to reconcile theory and experiment the influence of the finite conductivity of the bounding plates has been receiving increasing attention. We review recent progress in this area, and discuss in particular rigorous variational bounds on the Nu-Ra scaling for finite Prandtl number convection for general thermal boundary conditions ranging between the fixed temperature and fixed flux extremes, including the case of plates of finite conductivity. We show in particular that the usual fixed temperature assumption is a singular limit of the full problem, while in the large-Ra limit, we find a bound of Nu  $\leq R^{1/3}$ , where R is a Rayleigh number in terms of the temperature drop across the full fluid-plate system.

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