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Stationary statistical properties of Rayleigh Benard convection at large Prandtl number.

We show that the infinite Prandtl number model captures stationary statistical properties of Rayleigh-Benard convection asymptotically at the singular limit of large Prandtl number. In particular we show that invariant measures of the Boussinesq system must contain subsequences that weakly converges to invariant measures of the infinite Prandtl number as the Prandtl number approaches infinity; the Nusselt number for the infinite Prandtl number model asymptotically bounds the Nusselt number for the Boussinesq system at large Prandtl number. We also derived a new upper bound on the Nusselt number for the Boussinesq system of the form $Ra^{1/3} \ln(Ra) + cRa^{7/2}/Pr^2$ where Ra and Pr are the Rayleigh and Prandtl number respectively. This new bound agrees with heuristic physical arguments and extends previous rigorous bound of the form $Ra^{1/3} \ln(Ra)$ due to Constantin and Doering (improved by Doering, Otto and Renzikoff). (Received August 11, 2006)