

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Ultimate State of Two-Dimensional Rayleigh-Bénard Convection between Free-Slip Fixed-Temperature Boundaries¹ JARED WHITEHEAD, CHARLES DOERING, University of Michigan — Rigorous upper limits on the vertical heat transport in two dimensional Rayleigh-Bénard convection between stress-free isothermal boundaries are derived from the Boussinesq approximation of the Navier-Stokes equations. The Nusselt number Nu is bounded in terms of the Rayleigh number Ra according to $Nu \leq 0.2891Ra^{5/12}$ uniformly in the Prandtl number Pr . This Nusselt number scaling challenges some theoretical arguments regarding the asymptotic high Rayleigh number heat transport by turbulent convection.

¹This research was supported in part by NSF DGE-0221611 and PHY-0855335. This work appears in Phys. Rev. Let. 106, 244501 (2011).

Jared Whitehead
University of Michigan

Date submitted: 03 Aug 2011

Electronic form version 1.4