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Conservative bounds on Rayleigh-Bénard convection with mixed thermal boundary conditions RALF WITTENBERG, Simon Fraser University — In studies of turbulent Rayleigh-Bénard convection, the potential effects of imperfectly conducting plates bounding the fluid on convective heat transport have been receiving increasing attention. We investigate the influence of boundaries of finite Biot number on variational upper bounds on the Nusselt number as a function of the Rayleigh number, using the background flow method in a formulation that interpolates between the extremes of fixed temperature (perfectly conducting) and fixed heat flux (perfectly insulating) boundary conditions. For finite Prandtl number convection, fixed temperature conditions are a singular limit of the full problem; we discuss this result and extensions to related contexts such as infinite Prandtl number and porous medium convection.

Ralf Wittenberg
Simon Fraser University

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