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Conservative bounds on heat transport in turbulent convection RALF WITTENBERG, Simon Fraser University, JARED WHITEHEAD, CNLS, Los Alamos National Laboratory — The scaling dependence of the Nusselt number measuring heat transport in turbulent convection with the driving force remains incompletely understood, despite considerable effort in experiment, direct numerical simulation and theory. Variational upper bounds derived systematically from the governing partial differential equations provide a constraint on the possible scaling behaviors. We survey conservative analytical bounds on turbulent heat transport derived via the background flow method, both those obtained rigorously and semi-optimal upper bounds computed by numerical solution of the variational problem over a restricted class of backgrounds. We consider a range of scenarios, including the effects of plate conductivity, velocity boundary conditions and/or infinite Prandtl number in Rayleigh-Bénard convection, as well as related problems such as internal-heating-driven and porous medium convection.

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