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Rotating turbulent Rayleigh-Bénard convection: Effect of weak rotation on boundary layers and heat transfer[1] RICHARD STEVENS, Twente University, HERMAN CLERCX, Eindhoven University, DETLEF LOHSE, Twente University — The Grossmann-Lohse (GL) theory[2] for the heat transfer in turbulent Rayleigh-Bénard (RB) convection heavily builds on the Prandtl-Blasius laminar boundary layer (BL) theory, according to which the thermal BL thickness λ_θ scales as $LPr^{-1/2}$ in the low Pr regime and with $LPr^{-1/3}$ in the high Pr regime. In an attempt to extend the GL theory to the rotating RB case, we study the influence of rotation on the thermal BL thickness in flow above an infinite rotating disk. We show that with rotation $\lambda_\theta \propto Pr^{-1}$ in the low Pr regime, whereas in the high Pr regime the scaling remains unchanged. Furthermore, we obtain an analytic expression for the Nusselt number in the Ekman case (fluid at infinity rotates at almost the same speed as the disk). We moreover introduce a model to explain the experimentally[3] and numerically[4] observed increased heat transfer (as compared to RB without rotation) at weak rotation.

[1]Stichting Fundamenteel Onderzoek der Materie (FOM).
[2]Grossmann and Lohse, J. Fluid Mech. 407, 27 (2000)
[3]Rossby, *J. Fluid Mech.* **36**, 309 (1969)
[4]Oresta et al *Eur. J. Mech.* **26**, 1 (2007); Kunnen et al *Phys. Rev. E* **74**, 056306 (2006).

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