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**Thermal boundary layer measurements in turbulent rotating Rayleigh-Bénard convection**[1] JIN-QIANG ZHONG, HUI-MIN LI, WEN-DAN YAN, Tongji University — We report measurements of the temperature boundary layer (BL) profile T($z$) in rotating Rayleigh-Bénard convection along the centerline of a cylindrical sample. The measurements are taken for two Prandtl numbers Pr=6 and 40, with Rayleigh numbers in the range $5.8\times10^8\leq$Ra$\leq6.3\times10^9$ and inversed Rossby numbers $0\leq1/\text{Ro}\leq8$. In this parameter range pronounced enhancement of the heat transport (up to 22% in Nu) is observed. Measurements of T($z$) reveal two regimes in which the effects of the applied rotations on the BL profiles differ markedly. In a low-Ra and high-Pr regime, the thermal BL thickness $\lambda$ decreases with increasing 1/Ro in accord with the global Nu-enhancement. In the other regime with relatively high Ra$> 2.2\times10^9$ and low Pr, however, $\lambda$ is found to be independent of 1/Ro. The root-mean-square temperature prfiles $\sigma(z)$ exhibit power-low dependence $\sigma(z)\propto z^{\beta(Ro)}$ when $z > \lambda$. The exponent $\beta$(Ro) is $-0.6\pm0.05$ when 1/Ro=0, but increases with increasing 1/Ro and is asymptotic to $\beta(\infty)=-0.2\pm0.02$ at large 1/Ro, indicating temperature fluctuation remains dominant in a broader domain outside the thermal BL that is ascribed to the Ekman pumping effect.

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Jin-Qiang Zhong
Tongji University

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