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Direct numerical simulation of turbulent heat transfer in annuli: Effect of heat flux ratio

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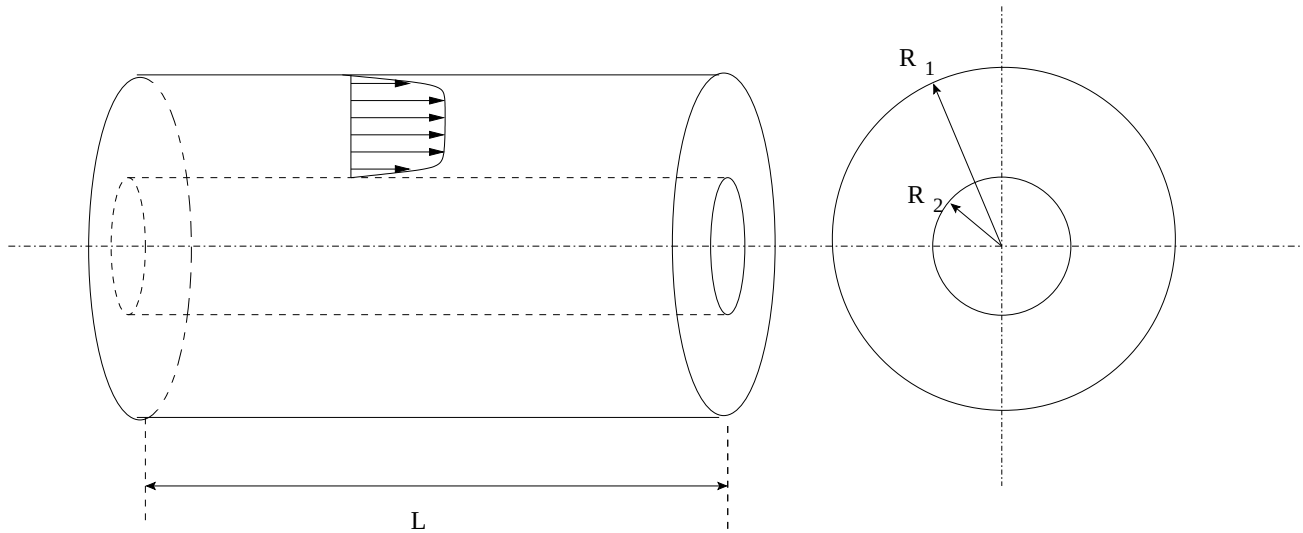

Figure 1: Schematic of the computational domain.

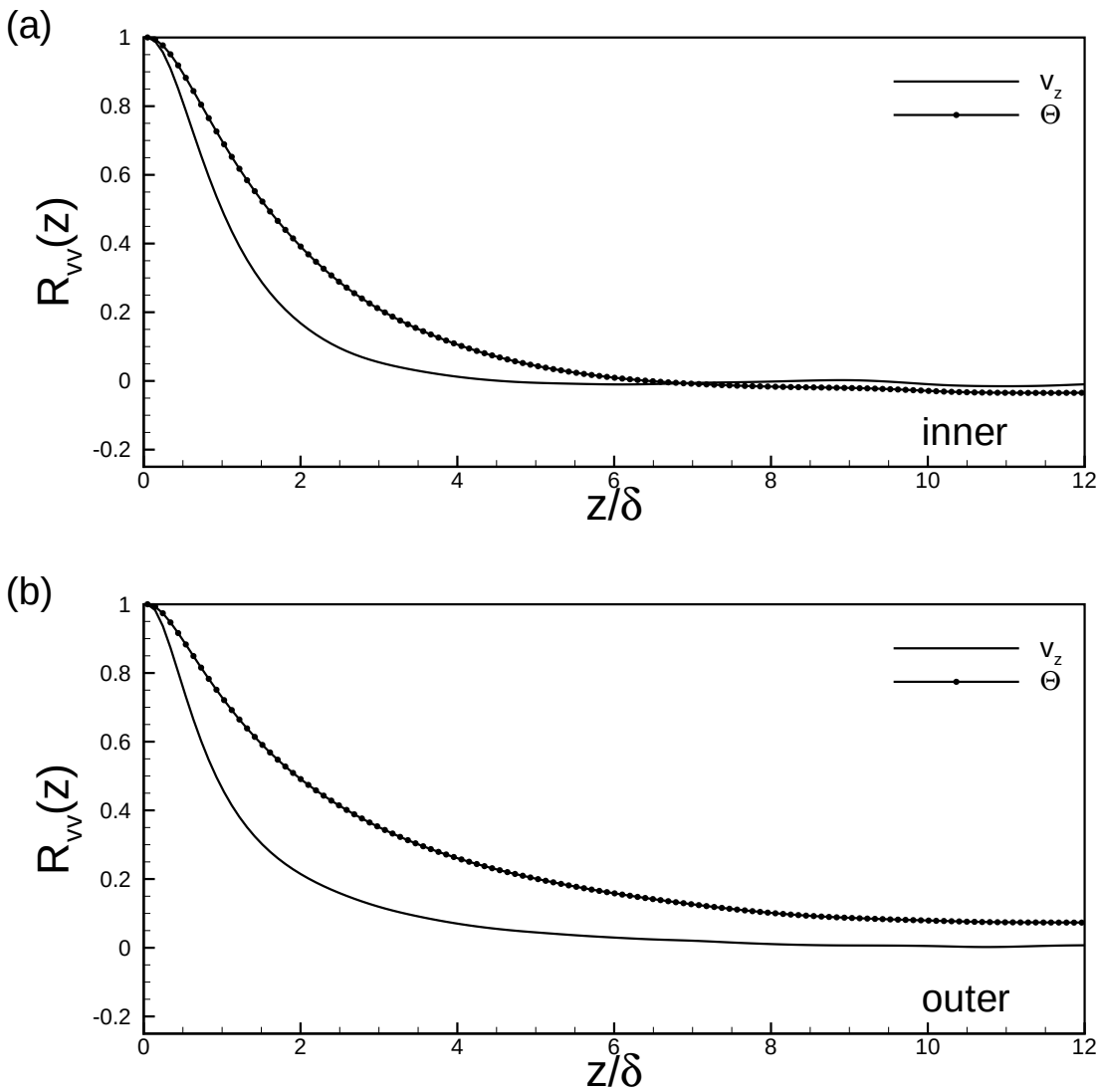

Figure 2: Two-point correlations in the axial direction.

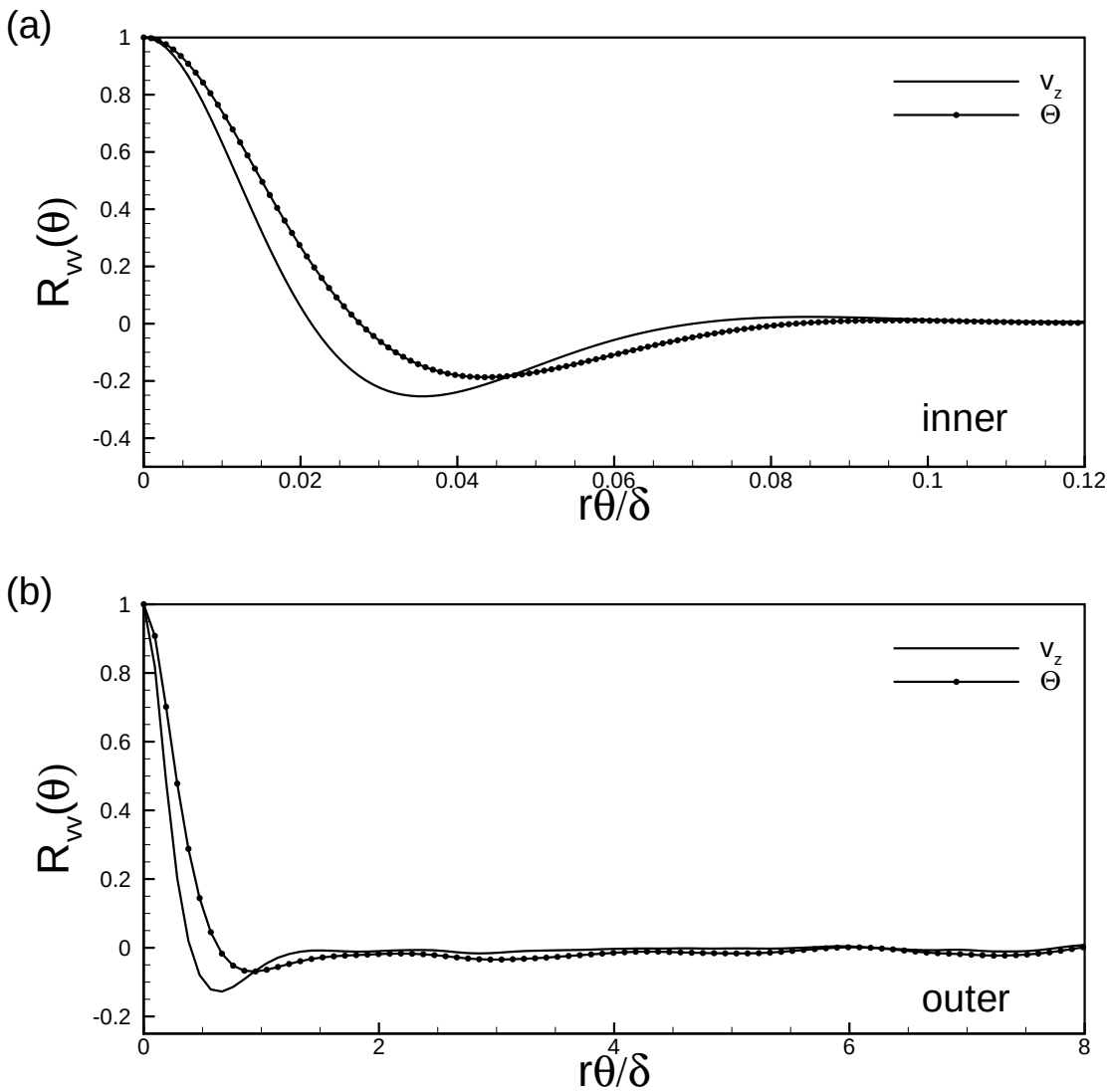

Figure 3: Two-point correlations in the azimuthal direction.

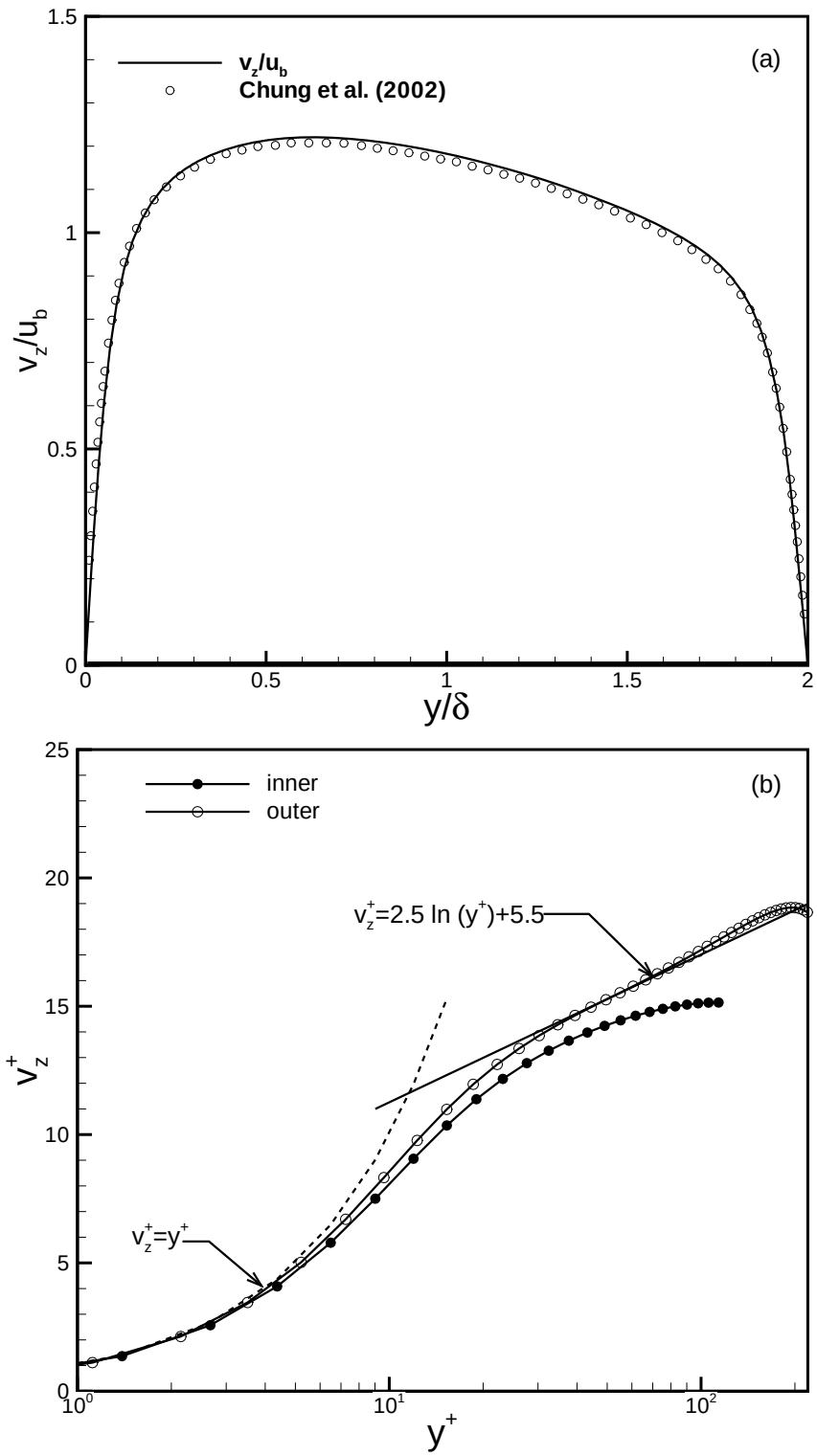

Figure 4: Mean velocity profile.

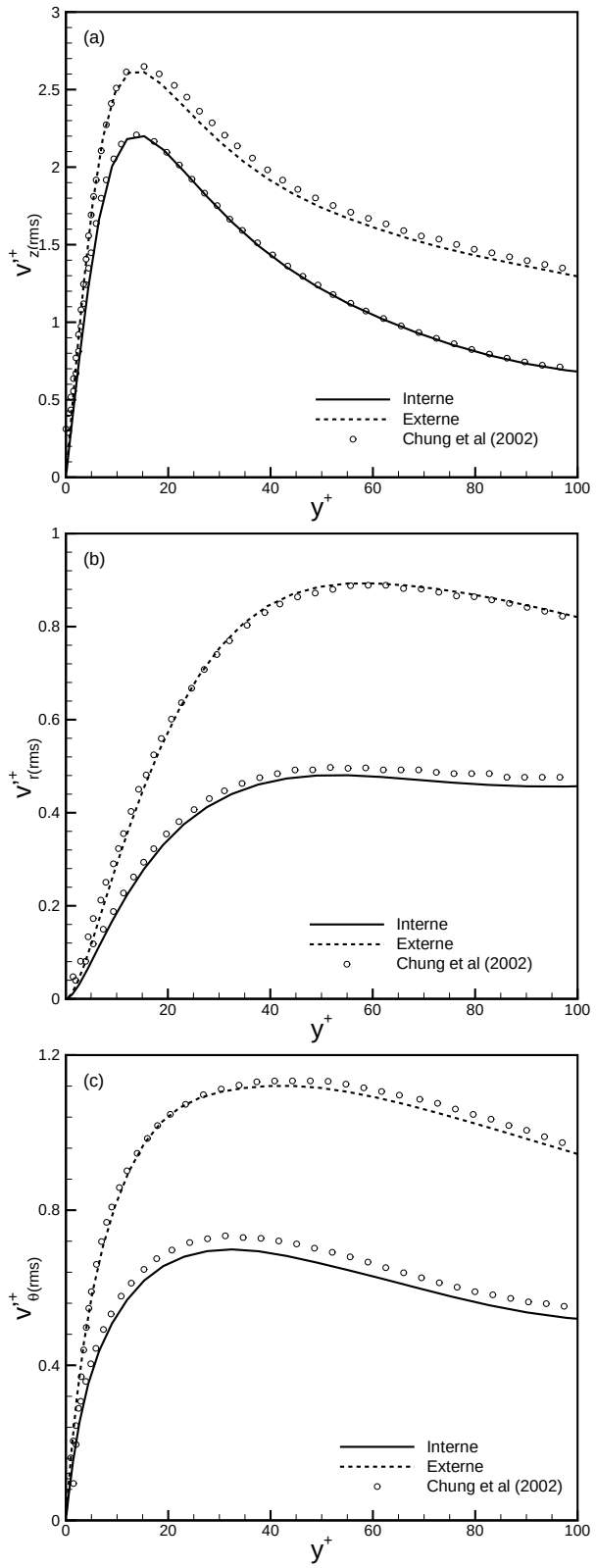

Figure 5: RMS velocity fluctuations: (a) streamwise, (b) radial, (c) azimuthal.

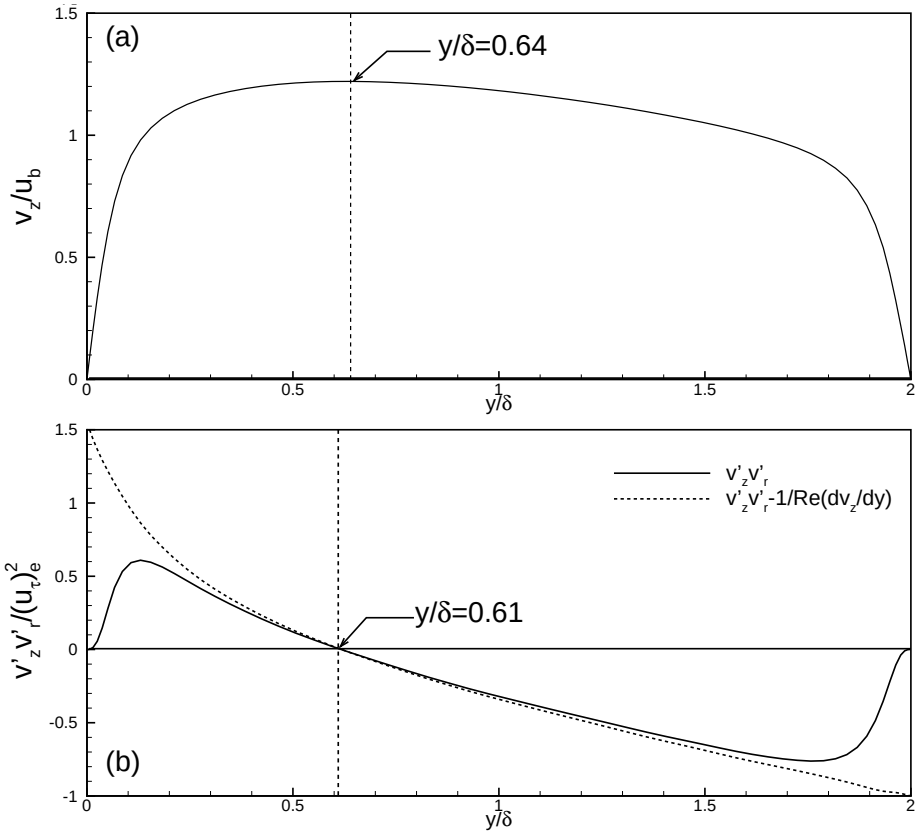

Figure 6: Positions of zero total shear stress r_0 and maximum velocity r_{max}.

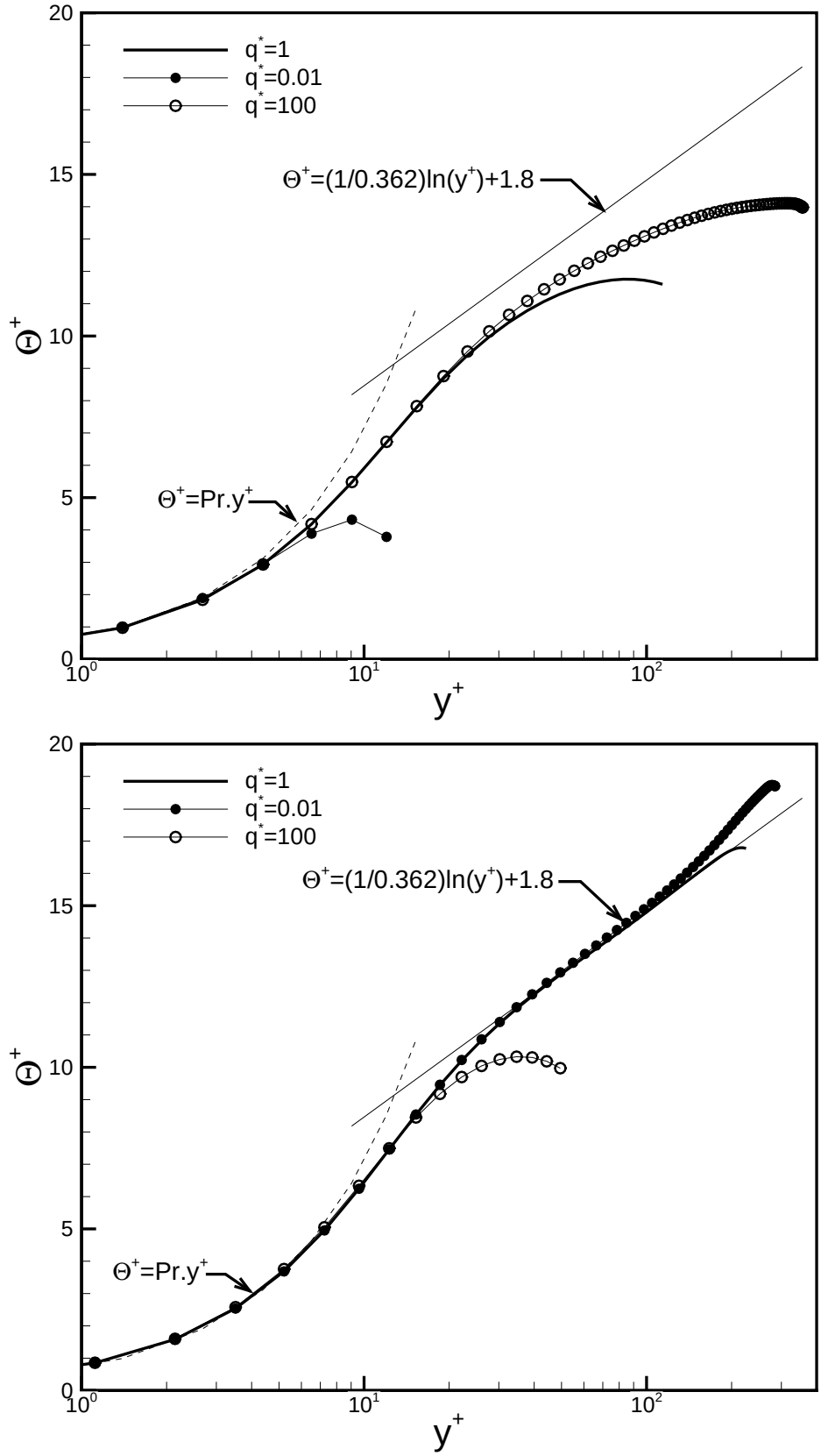

Figure 7: Mean temperature profiles. (a) inner cylinber, (b) outer cylinder

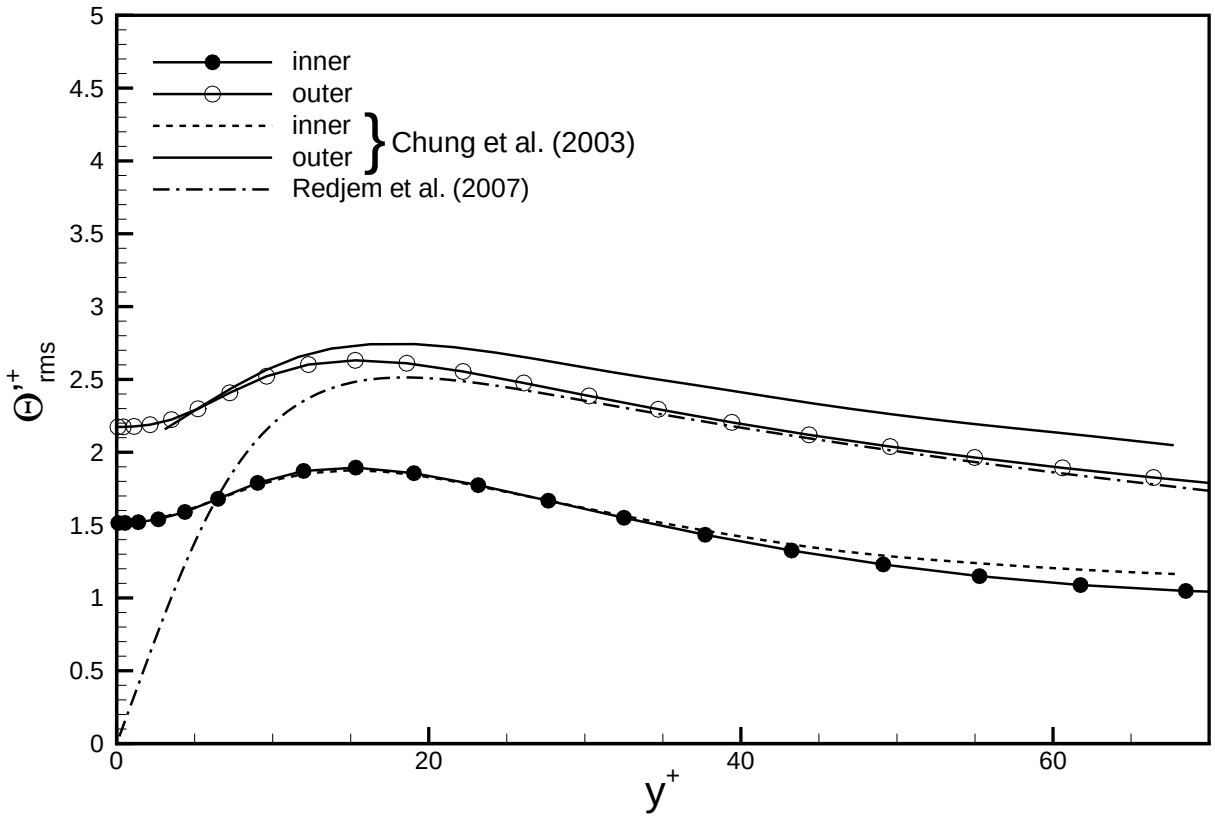

Figure 8: RMS of temperature fluctuations for $q^* = 1$.

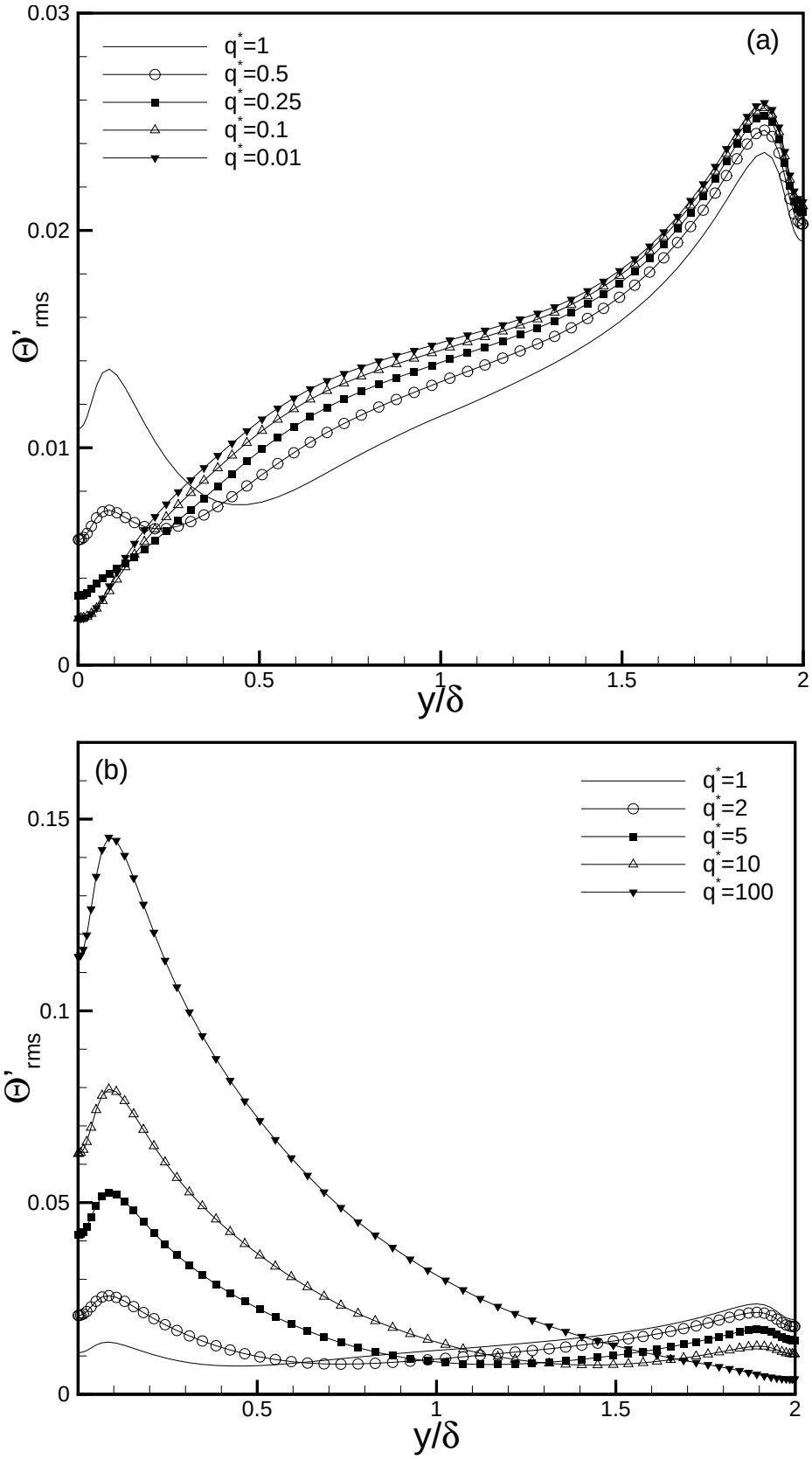

Figure 9: RMS of temperature fluctuations for various heat flux ratios. (a) $q^* \leq 1$, (b) $q^* \geq 1$

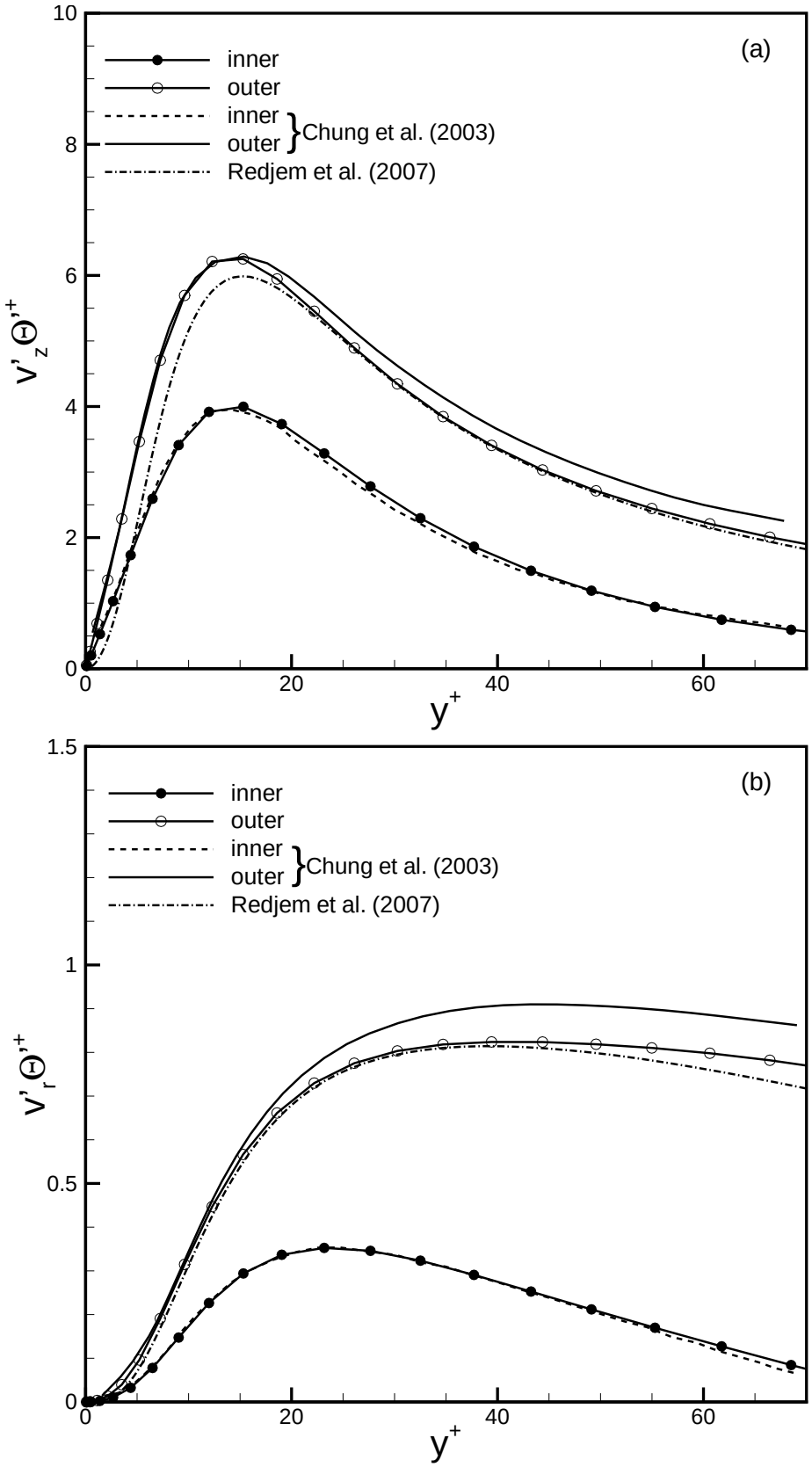

Figure 10: Turbulent heat fluxes for $q^* = 1$. (a) streamwise component, (b) wall-normal component

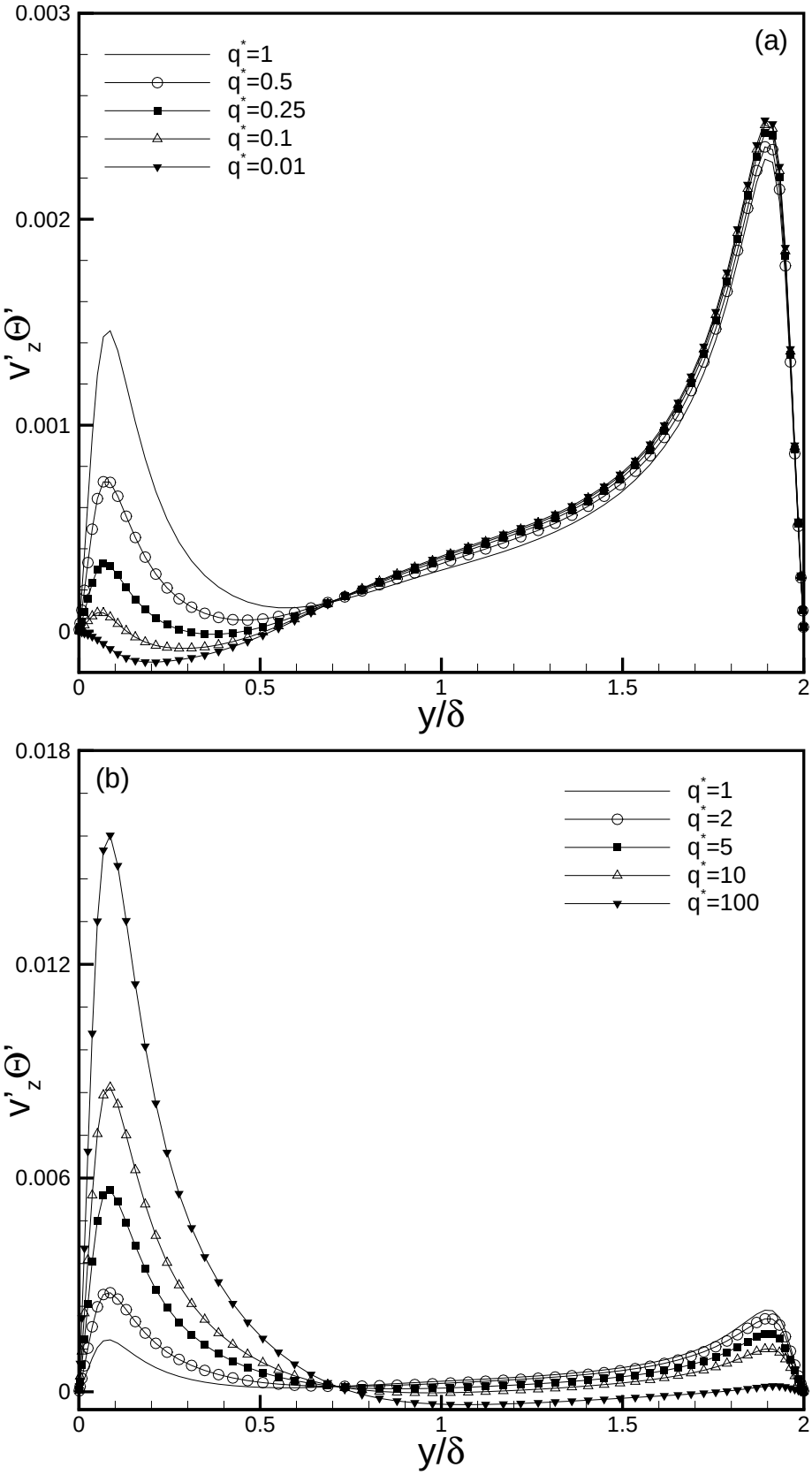

Figure 11: Streamwise turbulent heat flux for various heat flux ratios. (a) $q^* \leq 1$, (b) $q^* \geq 1$

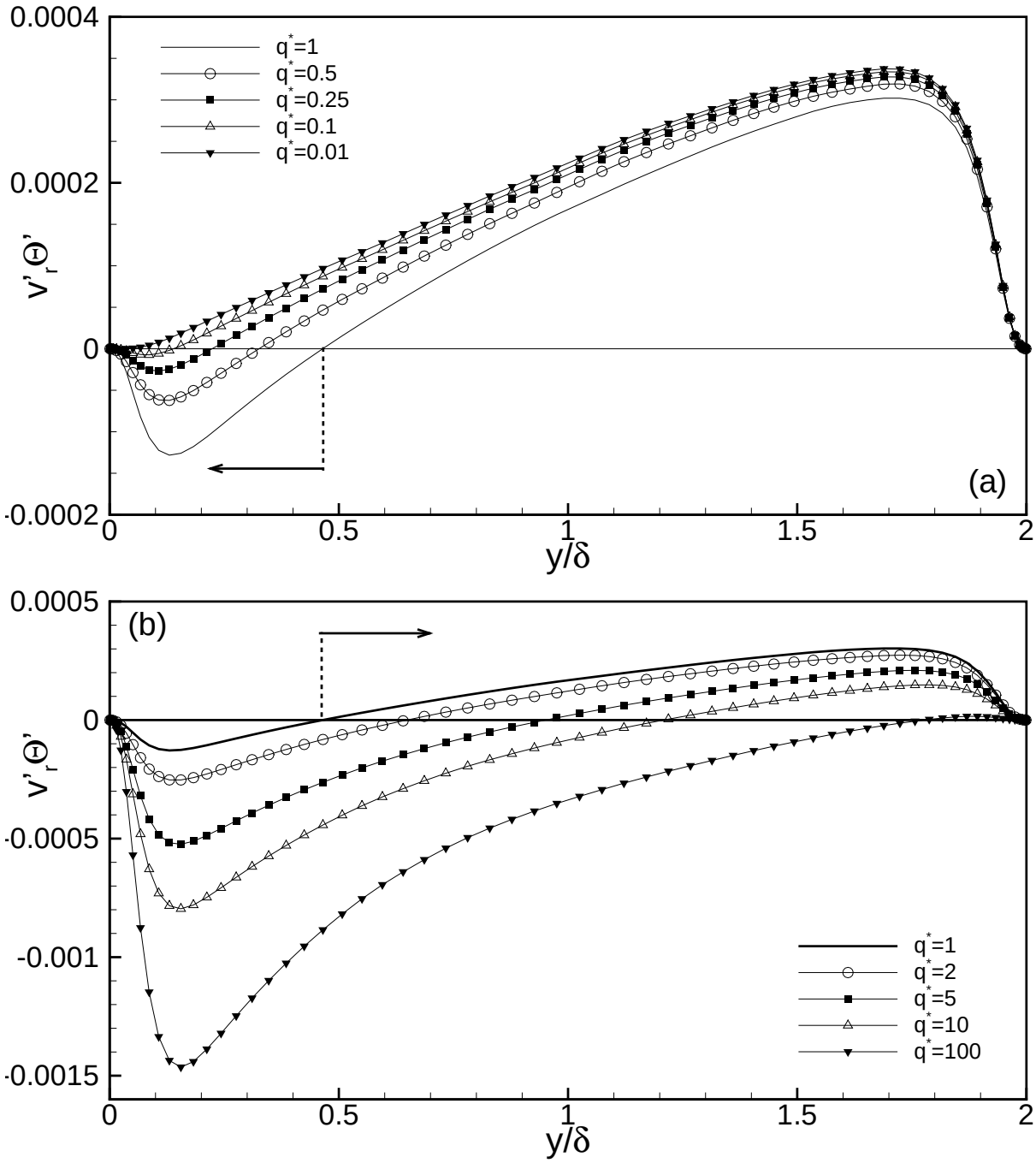

Figure 12: Wall-normal turbulent heat flux for various heat flux ratios. (a) $q^* \leq 1$, (b) $q^* \geq 1$

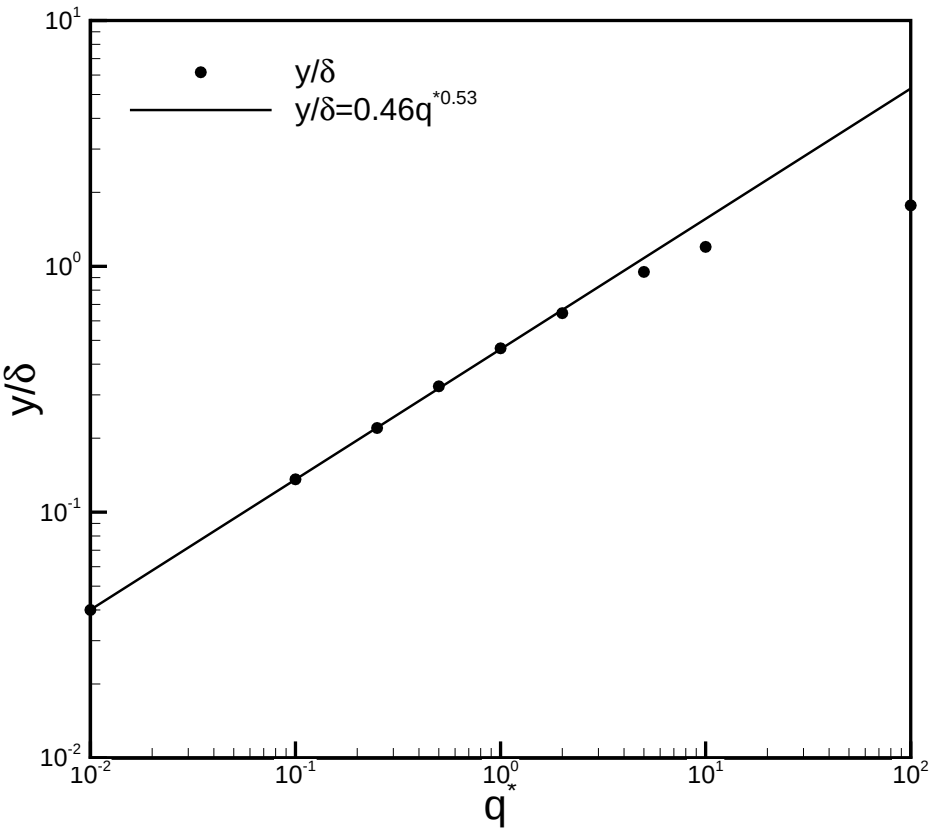

Figure 13: Position of zero wall-normal turbulent heat flux versus heat flux ratio.