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Wall scaling laws for turbulent BL before and after the Reynolds shear stress maxima NOOR AFZAL, Professor, ABU SEENA, BUSHRA AFZAL, Engineer, NOOR AFZAL COLLABORATION, ABU SEENA TEAM, BUSHRA AFZAL TEAM — The turbulent shear flow has a critical point due to maximas of Reynolds stress tensor has significant role. Three layers with length scales (inner ν/u_τ, meso $\sqrt{\nu\delta/u_\tau}$, outer δ) have been analyzed. Below this crucial point the mesolayer inner limit matches with with outer limit of wall layer. Above this crucial point the outer limit of mesolayer matches with inner limit of outer layer. The log law velocity and Reynolds in two overlap regions, above and below the critical point, have been presented. The Reynolds shear stress maxima τ_{max}/τ_w occurs at a point where ratio of mesolayer to outer lengths is of order $R_\tau^{-1/2}$ $(= \sqrt{\nu/\delta u_\tau})$, and at this point DNS and experimental data predict $U_m/U_e = 2/3$ (where Um = mesolayer velocity and Ue = velocity at boundary edge). The turbulent burst time period also scale with mesolayer time. The shape factor in a TBL shows linear behavior with non-dimensional mesolayer length scale. In special case $U_m/U_e = 1/2$, is due to Izakson and Millikan. The above predictions are supported by experimental and DNS data.

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