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Inference of the turbulent dissipation rates in wall-bounded turbulent flows[1] SUBHAS VENAYAGAMOORTHY, FARID KARIMPOUR, Colorado State University — Accurate prediction of the dissipation rate of the turbulent kinetic energy (ϵ) in turbulent flows is fundamental for modeling of such flows. However, measuring the dissipation rate of the turbulent kinetic energy has always been a challenge in laboratory experiments, especially near the wall. The focus of this study is to investigate and predict the dissipation rate of the turbulent kinetic energy (ϵ) in fully developed wall-bounded turbulent flows. To this end, new parameterizations for the mixing length ($L_{mix} = (-\overline{u'v'})^{1/2}/S$) in fully developed wall-bounded turbulent flows are proposed and their relationship with the dissipation rate of the turbulent kinetic energy is investigated. Comparisons with different datasets of direct numerical simulation of canonical wall-bounded turbulent flows show remarkable agreement. These findings could be useful for the prediction of ϵ in wall-bounded turbulent flows, especially in the highly anisotropic near-wall region.

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