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## TURBULENT FLOW CHARACTERISTICS NEAR ROUGH SIDE-WALL BOUNDARY

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### **Abstract**

This work reports an experimental study of the effects of side wall roughness on the transport and mixing properties in turbulent boundary layer (TBL) created in free surface flow. A train of ribs consists of circular rods placed vertically at the side wall with closely spaced having pitch-to-height ratios ( $p/k$ ) of 2, 3 and 4 in the longitudinal direction. It covers the entire length of the channel to create a rough side wall surface. The detailed three-dimensional velocity measurements were performed over the roughness at several stream-wise locations along the mid-depth of flow up to the fully developed region starting 2.5 m away from the inlet of the channel. The transverse profiles of mean velocity, turbulent intensity and Reynolds shear stresses were plotted to study the variation of turbulent characteristics over closely spaced rough side wall boundary. The turbulent characteristics are also discussed in fully developed regions of the flow for smooth and rough boundary layer. The results show that surface roughness enhances the level of turbulent intensity and shear stresses. The energy spectra and Shannon entropy are also presented in a fully developed zone for the three different pitch-to-height ratios.

*Key words:* energy spectra, rough sidewall, Shannon entropy, turbulent boundary layer, turbulent intensity

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