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Measurement of Turbulent Flows and Shear Stress on Open Channels

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Abstract. The phenomenon of turbulent flows becomes a virtual object in any changes in open channel flow hydraulics. Turbulent flow and shear stress have a role in the geometrical changes of bed channel and sediment movement. The dynamics of turbulent flow are consequences of hydraulic channel dynamics. Turbulent flow has excessive kinetic energy resulting in resistance force because the increase of friction effect and infraction in turbulent flow creates a complex phenomenon. Shear stress is in the eternal pressure of flow against the deformation of the primary basic form of channel. The research aims to analyze turbulent flow, shear stress, and bed scours ' phenomena and potential. Measurement of turbulent flows is by measuring the flow velocity in four segments at a distance of 100 cm each. The channel's cross-section is divided into nine parts and five measurement points in the flow depth of inner and outer regions. There are three variations of channel discharge and slope, i.e., low discharge (Q1), medium discharge (Q2), large discharge (Q3), and downward slope (S1), medium slope (S2), and high pitch (S3). The parameter of turbulent flow analysis, shear stress includes flow velocity average (U), flow depth (h), channel slope (S), viscosity (φ), the mass density of the liquid (ρ), the characteristic length or hydraulic radius (L/R) by using an empirical equation approach. Turbulent flow analysis used dimensionless Reynolds' number equation approach. The effect of hydrodynamic on turbulent flow causes the distribution of shear and scour stress, transport, and sediment deposition. The increase in the slope of the channel affects the increase in the values of shear stres