Effect of some hydraulic parameters on calculation of bed shear stress in open channels

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It is essential to have an accurate estimation of bed shear stress, as it is the governing parameter in sediment transport studies in open channels, rivers and streams. There are several different methods to calculate shear velocity and hence the bed shear stress, but they do not produce comparable results due to the variability of the hydraulic parameters involved. Among these roughness height and reference bed level are predominant. This paper addresses the sensitivity of these two parameters on shear velocity and an attempt has been made to correlate them with the governing parameters that define the hydraulic problem.

A series of laboratory experiments were carried out to investigate the effect of these two parameters on bed shear stress. Velocity profiles were measured and shear velocities were calculated using five different methods. Comparison of the results showed that the shear velocities estimated by these methods vary within a wide range. However, it is interesting to note that the shear velocities calculated by first four methods very nearly coincide at a particular reference bed level. The reference bed level corresponding to this common point changes with the discharge, channel bed slope and the roughness height. Roughness height and the reference bed level significantly influenced the shear velocity.

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