

The XXXVI International School of Hydraulics, 23-26 May 2017, Jachranka, Poland

Variation of Turbulence Characteristics in Developing Narrow Open Channel Flow

M. MAHANANDA¹ and P. R. HANMAIAHGARI¹

¹ Department of Civil Engineering, Indian Institute of Technology Kharagpur
721302 Kharagpur, West Bengal, India
email: minashee.m@iitkgp.ac.in

ABSTRACT

A detailed experimental investigation of streamwise variation of turbulence characteristics is carried out in developing and fully developed flow over a fixed rough bed. Experiments are conducted in a rectangular flume and keeping flow aspect ratio as 4.07. In this study, instantaneous 3-D velocities were measured using a Nortek Vectrino plus downlooking ADV. The characteristics of normalized three dimensional flow velocities, turbulence intensities and Reynolds shear stress have been investigated. In the developing flow region, the maximum time-averaged streamwise velocity is increasing with increasing streamwise distance. The maximum value of time-averaged lateral velocity is occurring in the vicinity of the free surface; however the peak value of time-averaged vertical velocity is located either near the bed or free surface. Vertical distributions of turbulence intensities in the outer region along the developing flow are found to be deviating from the respective trends of fully developed flow. In the developing flow region, the negative sign of normalized Reynolds shear stress was observed in the outer layer due to velocity retardation which signifies the existence of dip phenomenon.