



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

Name of the Student : ANURAG SHARMA

Roll Number : 156104013

Programme of Study : Ph.D.

Thesis Title: Structure of Turbulence in a Non-uniform Sand Bed Channel with Emphasis on the Bedload Transport

Name of Thesis Supervisor(s) :Dr. Bimlesh Kumar

Thesis Submitted to the Department/ Center :Civil Engineering

Date of completion of Thesis Viva-Voce Exam :9/3/2018

Key words for description of Thesis : Turbulence, Sediment Transport, Seepage, Sheet Flow Work

---

**SHORT ABSTRACT**

The present research work experimentally investigates the effect of flow on non-uniform sand bed channel morphology and corresponding turbulent flow characteristics. An important parameter of sand bed channels, downward seepage, was considered in the present work. Measures of turbulent parameters such as velocity, Reynolds shear stresses, thickness of roughness sub layer and shear velocities were found increasing with seepage which is responsible for increment in bed material transport. An empirical model of bedload transport is proposed considering seepage as an explicit variable. The bedload transport increased quickly with time for no seepage and seepage runs, reached the maximum value beyond which it is gradually decreases till it becomes approximately constant. Based on the experimental data of no seepage and seepage runs for whole permeable sand bed, we have proposed the empirical expression of bedload transport rate as a function of time. Large amount of sediment eroded from the beds is transported in the form of sheet flow over the bed and the sediment particles move in such a way that the particles roll over one another. The rate of sheet flow movement is increased with seepage, owing to increased turbulent measurements with seepage. Seepage increases average bed celerity and also increases the celerity of sheet flow of similar length scales. The increment of sheet flow celerity with seepage is confirmed from the saturation level of the wavelet power spectra of bed elevation series. The presence of seepage also affects the non-uniformity of collective sheet material.