

Experimental Study of the Dynamics of Sediments in Natural Channels in a Non-Stationary Flow Regime

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Abstract : Knowledge of sediment characteristics is fundamental to understanding their sedimentary functioning: sedimentation, settlement, and erosion processes of cohesive sediments are controlled by complex interactions between physical, chemical, and biological factors. Sediment transport is of primary importance in river hydraulics and river engineering. Indeed, the displacement of sediments can lead to lasting modifications of the bed in terms of its elevation, slope and roughness. The protection of a bank, for example, is likely to initiate a local incision of the river bed, which, in turn, can lead to the subsidence of the bank. The flows in the natural environment occur in general with heterogeneous boundary conditions because of the distribution of the roughnesses of the fixed or mobile bottoms and of the important deformations of the free surface, especially for the flows with a weak draft considering the irregularity of the bottom. Bedforms significantly influence flow resistance. The arrangement of particles lining the bottom of the stream bed or experimental channel generates waveforms of different sizes that lead to changes in roughness and consequently spatial variability in the turbulent characteristics of the flow. The study which is focused on the laws of friction in alluvial beds, aims to analyze the characteristics of flows and materials constituting the natural channels. Experimental results were obtained by simulating these flows on a rough bottom in an experimental channel at the Hydraulics Laboratory of the University of Batna 2. The system of equations governing the problem is solved using the program named: CLIPPER.5 and ACP.

Keywords : free surface flow, heterogeneous sand, moving bottom bed, friction coefficient, bottom roughness

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