NEWLY DEVELOPED CONCEPTS IN MOBILE-BED MODELING

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An assumption was stated by several researchers that part of the energy is consumed in transporting the sediment particles. However, there is no acceptable formula specifies the magnitude of that energy. This implies to investigate a conceptual sediment layer transported on the channel bed is considered to determine the part of the energy consumed in transporting the sediment layer. Derivation of the concept of the sediment transporting energy, was given by Fattah (2005). This newly developed concept has a very important effect on basic principles of alluvial channel hydraulics, for the reason that, the transporting energy represents part of the energy dissipated in the channel. Thus, the friction energy will differ than that considered by most of the researchers investigating the mechanics of sediment transport. The newly developed concept for the sediment transporting energy is used to propose a new bed-load formula as a function of a dimensionless critical shear stress parameter, modified Meyer-Peter and Muller formula, Fattah (2005) bed-load predictor. In the present study, the slope of the transporting energy line is used to compute the bed shear stress responsible for bed-load discharge instead of the friction slope as usually considered in most of the mobile-bed models. Accordingly in this study, formerly mentioned SEDiment TRansporting ENergy concept is the basis of the newly developed model, called SEDTREN model.

SEDTREN mobile-bed model is presented in which the new developments are considered. The model is calibrated using field data of the Rhone River reach, in France, utilizing the results computed by CARICHAR model presented by Rahuel et al (1989). Parametric evaluation of the SEDTREN model is carried to calibrate the model. The proposed model is applied to a hypothetical case for Atbara River reach, in Sudan. Parametric analysis for the simulated reach of alluvial channels by SEDTREN model was carried to study the effect of each of the model parameters, the dimensionless shear stress parameter and the sediment coefficient. Longitudinal profiles of Rhone River reach were simulated representing the rate of the transported bed load. The dimensionless shear stress parameter found to be related to the shape of delta formation. On the other hand, effect of varying the sediment coefficient value was investigated. The transporting energy line , as newly developed concept, for the Rhone river is plotted in Fig. (1) to show the energy dissipated in transporting the sediment particles along the reservoir

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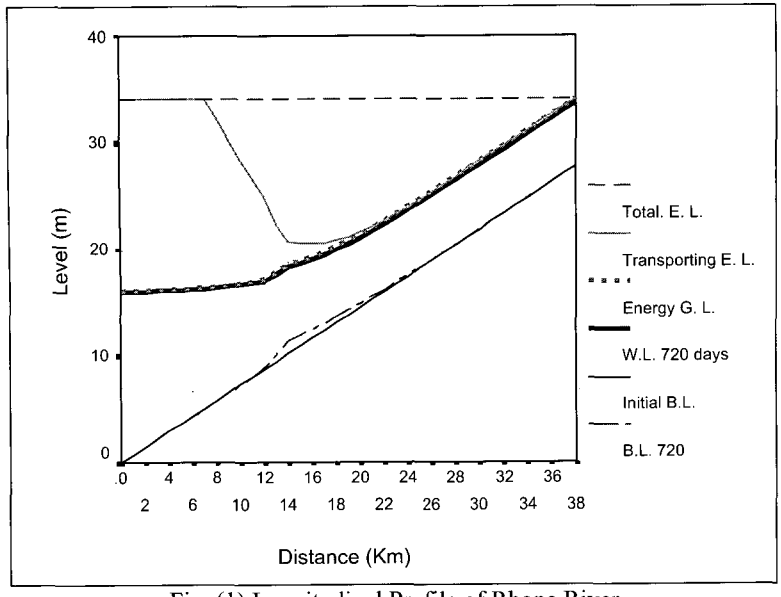

Fig. (1) Longitudinal Profile of Rhone River