

عنوان مقاله:

One-dimensional Numerical Model of Cohesive Sediment Transport in Open Channel Flow

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خلاصه مقاله:

Cohesive sediment transport remains a complicated subject that hydraulic engineers are frequently faced with in water-related engineering problems. This is primarily affected by the macroscopic aspects of water-sediment system characteristics. In this paper a 1-D mathematical model was developed to be employed in predicting the cohesive sediment transport under simultaneous conditions of erosion and deposition. This model is based on the convection-diffusion equation with proper source and sink terms and dispersion coefficient. The equation developed in the model has been solved by applying the finite volume approach. The model has been calibrated by employing the optimization technique using laboratory experimental data. For optimization, the transformed Powell's method has been employed. The data were collected in a flume of 10 m length, 0.30 m width and 0.45 m height. The applied discharges and concentrations were between 3 to 5 lit/sec and 7 to 15 lit sec⁻¹, respectively. The performance of this model has been assessed using two data sets: a set obtained in this study, and another provided by other researchers. The model shows good agreement with both data sets. The results obtained suggest that the deposition and erosion are functions of flow concentration, flow depth and shear stress exerted on bed.

کلمات کلیدی:

Cohesive sediment, Convection-dispersion equation, Deposition, Erosion

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