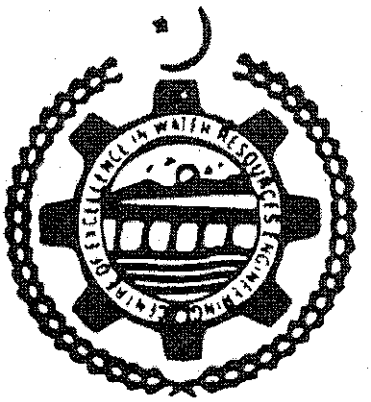
THESIS

DEVELOPMENT OF 2-DIMENSIONAL HYDRAULIC AND SEDIMENTATION MODEL IN A CHANNEL FOR LOW FLOW REGIME



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ABSTRACT

Sedimentation has always been an imperative problem in rivers, canals, small streams and lakes or reservoirs as well. Water from the hilly areas brings a huge amount of sediments with it. Channels and streams are badly affected by the inflow of sediments. Study of sediment transport in the channels and streams is of much importance as it is crucial to know the sediment concentration, bed change and bed morphology of the channels. Application of physical models for designing of small hydraulic engineering constructions is unfairly expensive. Usually empirical methods are applied for calculation of construction parameters. For design of different engineering constructions and artificial channels/streams, it is possible to use the computer models based on some mathematical equations. Simulations made by such models determine trends of channel deformations and allow the consideration of the required number of alternatives for the arrangement of hydraulic structures. The sediment simulation of small hydraulic structures by numerical models saves time and a precisely calibrated model gives most accurate results.

The model was calibrated with the observed values for a sediment concentration of 500 ppm. The results showed that the computed values of the velocity component in the flow direction are in agreement with the observed values. The average percentage difference was about 3%. The velocity components in the vertical direction were negligible. Sediment concentration was noted at different cross section and compared with the model results. The percentage difference was noted at an average of 4%. The maximum percentage difference for flow and sediments were 6% and 7% respectively. For 500 ppm sediment safely passed through the channel at selected flow conditions

without disturbing the channel bed elevation. But the results of the simulation for 1000 ppm, 1500 ppm, 2000 ppm, 2500 ppm were 4%, 12%, 18% and 26% increment in bed level. Overall results of the model compared well with the observed data.