Verification and Application of Finite Element Model Developed for Flood Routing in Rivers

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Abstract : Flood wave propagation in river channel flow can be enunciated by nonlinear equations of motion for unsteady flow. However, it is difficult to find analytical solution of these complex non-linear equations. Hence, verification of the numerical model should be carried out against field data and numerical predictions. This paper presents the verification of developed finite element model applying for unsteady flow in the open channels. The results of a proposed model indicate a good matching with both Preissmann scheme and HEC-RAS model for a river reach of 29 km at both sites (15 km from upstream and at downstream end) for discharge hydrographs. It also has an agreeable comparison with the Preissemann scheme for the flow depth (stage) hydrographs. The proposed model has also been applying to forecast daily discharges at 400 km downstream from Sukkur barrage, which demonstrates accurate model predictions with observed daily discharges. Hence, this model may be utilized for predicting and issuing flood warnings about flood hazardous in advance.

Keywords : finite element method, Preissmann scheme, HEC-RAS, flood forecasting, Indus river
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