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Abstract
A storage cell based numerical model for the simulation of floodplain inundation resulting from slow rising floods in rivers is presented. Flow through the river is computed by solving the one-dimensional Saint-Venant equations using four-point Preissmann implicit finite difference scheme. A storage cell model is developed for simulating the spread of flood on the floodplains, using a finite volume discretization. The areal extent of the floodplain is discretized into unstructured triangular grids. Flow exchange between the adjoining floodplain cells is represented by the diffusive-wave approximated equation. The computational expense in inverting matrices is dealt by adopting double sweep algorithm for the channel and gradient descent algorithm for floodplains. In this study, flows through the channel and the left and the right floodplains are linked through iterative coupling. The iterative coupling of channel and floodplains are accomplished by considering diffusive-wave approximated equation for mass transfer. The accuracy in flow predictions is validated with respect to the two-dimensional Hydrologic Engineering Center's River Analysis System (HEC-RAS) model. For a large channel with vast floodplain, the computational time required for inverting the global matrix is enormous. The modularization of channel and floodplains and the subsequent iterative coupling could reduce the immense requirement of computational memory and storage thus enhancing the computational efficiency.