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Influence of the bank vegetation on the river bed variations

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In the natural rivers, woody vegetation commonly grows along the riverbank. When flood flows run through the woody vegetation zones, the stream processes are markedly affected. This study experimentally discusses the characteristics of flow fields and the changes of river bedform while water flows through woody vegetation zones. The experiments were produced in a flume with 20m long, 1m wide, and a fixed slope of 0.001. The woody vegetation was set in 10 square centimeters at one side of the flume. Experimental vegetation was simulated by the steel columns due to the stem of emergent woody vegetation near bed is rigid. The experimental flow was steady and flow velocity was adopted to near the critical flow for the initiation of sediment motion. Uniform sand with a median size of 0.88 mm was used as the bed sediment. The three dimensional flow fields of time-averaged velocity distributions and turbulent characteristics were measured by an Acoustic Doppler Velocimeter(ADV). The bed morphology of equilibrium scour condition was measured by a Laser Distance Meter. The interactions between water flows and river bed with vegetation ware investigated by observing the scour and deposition processes around the vegetation zone. In addition, the flow fields at flat bed and equilibrium scour conditions are measured separately. Furthermore, the influence of vegetation density on the flow and bedform was investigated by using the present experiment. When the flows passed through the vegetation zones, the approaching flow was retarded by the vegetation zone along the vegetation-bank side and accelerated in the main channel. The flow velocities also reduced downstream of the vegetation zones and the water depths dropped significantly in the streamwise direction. It was observed that the levels of the sediment deposition decreased at downstream of the vegetation zones as the vegetation density increased. Near the vegetation zone, the size of the scour hole increased as the vegetation density increased.