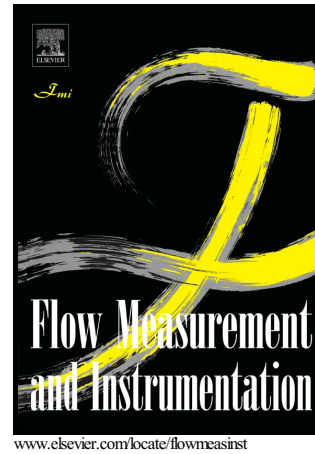


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Sediment flushing upstream of large orifices: an experimental study

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Abstract

Due to the constricting and localization of flow by orifices, these hydraulic structures are commonly used in dams and water impoundment reservoirs to flush deposited sediments. They are also one of the most important flow measurement structures. In this study, the flow characteristics at upstream of a large circular orifice located at the wall of a water reservoir, in the case that the sediments were accumulated behind it, was investigated. The experiments were performed at the hydraulic laboratory of Shahid Bahonar university of Kerman, in a model of rectangular reservoir. The experiments were performed in two parts. First, the flow behavior during the scour development at upstream of the orifice and the extent of sediment erosion due to the orifice flow was investigated. Next, a semi-confined structure was located at the upstream of orifice to increase the sediment removal efficiency. The effect of the geometrical characteristics of structure on the dimensions of scour hole was determined. It was observed that the interactions of water, sediment and structure generated strong vortices upstream of the orifice, which caused the lifting and sweeping away of a large amount of sediment from the reservoir and led to formation of a semi-cone hole upstream of the orifice.

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