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Experimental Study of Porous Cylinder Affected Topographic Evolution

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ABSTRACT

In this paper we report a series of live-bed experiments aimed to examining the topographic evolution behind a porous cylinder. The flume is 250 cm long, 30 cm wide and 30 cm high, with a circulated water supply system and steady dry sand supply. During the experiment, we used overhead time-lapse photography to record the rapid topographic evolution every 5 second. Each experiment was divided ten successive stages. At the end of each stage, the topography was scanned and translated a high-resolution digital elevation model (DEM). We found that using a porous cylinder, instead of a solid cylinder, the scouring effect due to horseshoe vortex can be significantly reduced and can provide a vast of sediment deposits behind the cylinder. In this shelter zone, the length of the settled sediment may develop up to 15 times longer than the diameter of the porous cylinder. Our preliminary results imply that with the design of porous cylinders it may provide an alternative protection of river bank and bridge constructions.

KEY WORDS: porous cylinder; scour; live-bed experiment; river bank protection.