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An Experimental Investigation on Porosity in Gravel Beds

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ABSTRACT

This paper presents results from a set of laboratory measurements of the roughness geometry function and subsurface porosity at different spatial scales and with different beds using the water displacement method. For water worked gravel beds, the roughness geometry function was determined in both the interfacial sublayer and subsurface layer while for non-water worked bed configurations the vertical variation of porosity was evaluated from the manually created bed surface to the bottom, i.e. solely within the subsurface layer. The results show that the capillary action in sediment beds can have a significant influence on the porosity-values at the bed surface and the transition to a flat subsurface bottom as it was found that the capillary action over-/underestimates the porosity close to the gravel bed bottom and surface respectively. The results are subsequently used to discuss recent findings reported in the hydraulic engineering literature in regard to the vertical variation of porosity.