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Analysis of the river flow interaction with gabions

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ABSTRACT

The study examines the interaction of river flow with gabions in order to optimize their use for the treatment of acid mine drainage (AMD) contamination. The effects of the change in submerged volume, gabion arrangement and number of gabions on the mean residence time and its distribution are studied.

Gabions of dimensions (length x breadth x height) 0.29 m x 0.29 m x 0.175 m and a single gabion of dimensions 0.62 m x 0.62 m x 0.38 m have been tested in a 0.92 m wide flume in the Hydraulics laboratory in the School of Civil and Environmental Engineering at the University of the Witwatersrand, Johannesburg.

The study revealed that a decrease in the submerged volume, gabions arranged in an aligned pattern and increasing the number of gabions produced increased proportions of gabion-flow interaction. Generally, the proportion of gabion-flow interaction remained approximately the same except when twelve gabions, arranged in a staggered pattern, were tested. When testing twelve gabions there was a sudden decrease in the gabion-flow interaction when compared to four and eight gabions. The gabion-flow interaction increased again once the number of gabions was increased to sixteen. These results were confirmed by the results produced from a concentration dispersion model. This model simulated the flow of contaminated fluid ‘particles’ through a channel, which was divided into successive zones.