



Application of Artificial Intelligence Models to Estimate Discharge over Semicircular Weirs

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ABSTRACT

Weirs are one of the widely used hydraulic structures for measuring discharge in open channels. This study applies two artificial intelligence models named artificial neural network (ANN) and genetic programming (GP) to predict discharge flowing over semicircular weirs with different openings including sharp and semicircular crests. The considered data base was selected from the literature. The results of AI models were compared with those of two empirical formulas, which have been developed based on the same data for this purpose. Four evaluation criteria were considered for comparing the estimated discharges. The results obviously indicate that GP outperforms others based on the considered criteria.

Keywords:

Semicircular weirs, discharge artificial intelligence models, artificial neural network, genetic programming.

1. Introduction

Weirs are commonly utilized as one of the most conventional devices for flow measurement in open channels. They are generally classified based on the shape of crests and their opening types. The most common type of weirs may be the sharp-crested ones, which has either a V-notch or rectangular opening while trapezoidal weirs, semicircular weirs, triangular weirs, compound weirs, and flat-topped weirs are some other types of weirs. Different crest geometry or opening shapes bring about different characteristics to each type of weir while this variety made each weir be suitable for a specific applications in practice.