Abstract

Accurate measurement of the flow rate is one of the main applications of the side weirs in the normal operation and emergency condition. For such purposes however, the simple side weirs (typically rectangular) are not applicable. Appropriate estimation of the discharge coefficient is very important for designing side weirs,. In this study an artificial neural networks (ANNs) model was used to estimate discharge coefficient for compound sharp-crested side weir. For this purpose, the best combination of input parameters (Fr, $\frac{\bar{w}}{y_1}$ and $\frac{B}{y_1}$) was selected. Artificial neural networks with the ability of learning and estimation with the help of a mathematical structure, can display arbitrary combinations of non-linear processes and the link between inputs and outputs for each system. ANNs model was trained using the lab data during the learning process and used to predict unknown data. Model performance was evaluated using the coefficient of determination (R^2) and mean square error (MSE). Comparing the estimated values by the neural network and nonlinear regression equation of zahiri et al. (2013) showed that the artificial neural network model has good performance for estimating discharge coefficient of compound sharp-crested side weirs. Base on the results the MSE and R^2 were obtained 0/00014 and 0/82, respectively. Moreover a mathematical equation was obtained using the weights and biases from the neural network model. The results showed that this equation can be used to estimate the discharge coefficient for compound side weirs with acceptable accuracy.

Keywords: Artificial neural network, Compound sharp-crested side weir

University of Zabol

Graduate school

Faculty of Water and Soil

Department of Water Engineering

The Thesis Submitted for the Degree of M.Sc (in the field of Irrigation hydraulic Structures)

Prediction of the discharge coefficient for compound sharp-crested side weirs using artificial neural networks

Supervisor:

Dr. F. Hassanpour

Advisor:

Dr. A. Zahiri

By:

Alireza Dargahi

November 2013