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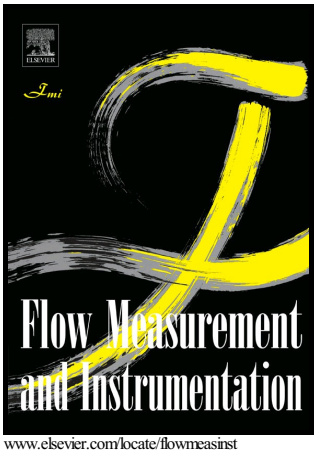

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Sensitivity Analysis of the Factors Affecting the Discharge Capacity of Side Weirs in Trapezoidal Channels using Extreme Learning Machines

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Abstract

Side weirs are installed on the side walls of main channels to control and regulate flow. In this study, sensitivity analysis is planned using Extreme Learning Machines (ELM) to recognize the factors affecting the discharge coefficient in trapezoidal channels. A total of 31 models with 1 to 5 parameters are developed. The input parameters are ratio of side weir length to trapezoidal channel bottom width (L/b), Froude number (Fr), ratio of side weir length to flow depth upstream of the side weir (L/y_1), ratio of flow depth upstream of the side weir to the main channel bottom width (y_1/b) and trapezoid channel side wall slope (m). Among the models with one input parameter, the model including Froude number modeled the discharge coefficient more accurately ($MAPE$=4.118, R^2=0.835). Between models with two input parameters, the model using Fr and L/b produced $MAPE$ and R^2 values of 2.607 and 0.913 respectively. Moreover, among the models with four input parameters, the model containing Fr, L/b, L/y_1 and y_1/b was the most accurate ($MAPE$=2.916, R^2=0.925).

Keywords: Side weir, Trapezoidal channel, Discharge capacity, Sensitivity analysis, Extreme learning machine (ELM).

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