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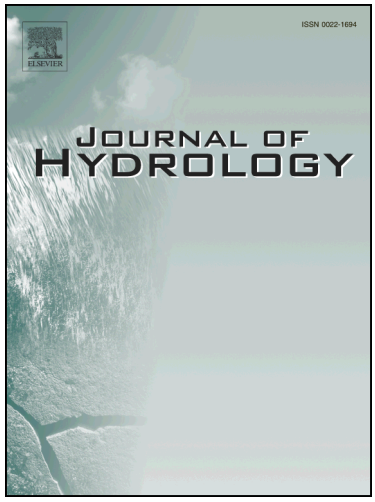

Research papers

High-performance approach for estimating stage-discharge curves in the open channels

Amirreza Kavousizadeh, Arash Ahmadi

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ACCEPTED MANUSCRIPT

High-performance approach for estimating stage-discharge curves in the open channels

Amirreza Kavousizadeh[1*], Arash Ahmadi [2]

1- M.Sc. graduated from Civil Engineering Department, Ferdowsi University of Mashhad, 91775-1111, Iran*

2- Ph.D. candidate in Civil Engineering Department, Ferdowsi University of Mashhad, 91775-1111, Iran

Kavousi@hotmail.com

Abstract

The stage-discharge relationship is one of the frequently used methods for continuous river flow measurement. In the management of water resources and flood control, the accuracy of the rating curve is a key priority. Various methods have been proposed for estimating the stage-discharge curves in open channels, including the model of Ahmadi et al. (2017) in which the rating curve was identified by utilizing the information of discharge at a referenced water level. In the present study, a novel approach was taken to improve that model by modifying its basic assumptions and employing multi-objective optimization. To this end, multivariate relationships were presented to determine the actual mean velocity in the flow cross-section. The unknown exponents of the proposed relationships were obtained by using the second version of the Strength Pareto Evolutionary Algorithm (*SPEA2*), and the appropriate equation was selected by applying the *TOPSIS* (Technique for Order Preferences by Similarity to an Ideal Solution) approach. The validity of the proposed method was assessed across 6 artificial and 6 natural hydraulic cross-sections. Results showed a close agreement between the estimated and observed data. In the next step, the results of the proposed method were compared with those of the previous model using the Mann-Whitney U test. The results demonstrated that the proposed model was more efficient than the previous one.

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