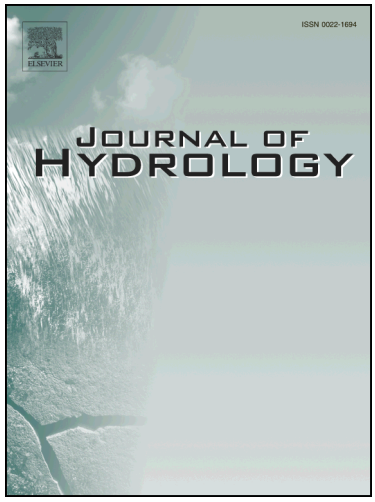

Research papers

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Stable alluvial channel design using evolutionary neural networks

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Abstract

Accurate prediction of the long-term average dimensions of alluvial stable channels is a significant problem in river engineering. The goal of this research is to investigate the effect of flow discharge (Q), mean sediment size (d_{50}) and Shields parameter (τ^*) on the stable channel dimensions by employing non-linear regression (NLR) and two Artificial Intelligence (AI) methods, including: Generalized Structure of Group Method of Data Handling (GS-GMDH) neural network and Gene Expression Programming (GEP). Discharge, grain size and Shields parameter from 85 gaging stations situated in three stable Iranian rivers were used as input data for the three methods to estimate the water-surface width (W), average flow depth (D) and longitudinal slope (S) of the rivers. Based on the results, it was found that the GS-GMDH produced more accurate results for simulating the channel width with a Mean Absolute Relative Error (MARE) value of 0.055; and GEP produced better estimations for channel depth and slope with MARE values of 0.035 and 0.03, respectively. Furthermore, by employing Artificial Intelligence (AI) methods (GS-GMDH and GEP), the RMSE values decreased by 22%, 25% and