

# **Performance comparison of ANN and ANFIS techniques to rainfall prediction and using MIKE11/NAM hydrological model to runoff simulation**

## **Abstract**

Rainfall-runoff modeling as one of the most important hydrological processes has key issues in flood forecasting and water resources studies. In addition, for prevention and control the flood damages, management and early warning of flood difficult, the rainfall prediction is necessary. The variety of models that have been developed to simulate these processes can be classified into physically based models, conceptual models and black-box models. In this study, rainfall of the Skandari and Qalehshahrokh subbasins located in upper of Zayandehrood dam watershed was predicted using Artificial Neural Fuzzy Inference System (ANFIS) and Artificial Neural Networks (ANNs) models by using historical rainfall data for a 10-year period (1999-2009). Also, the best input combination to rainfall prediction identify by genetic algorithm. Then, runoff discharge produced by the predicted rainfall and the observed rainfall were simulated by a conceptual hydrological model called MIKE11/NAM model and the results were compared together. Nine main parameters of the NAM model were calibrated for Skandari and Qalehshahrokh subbasins. The results indicated that ANFIS model can reasonably predict rainfall. The NAM model simulates the base flows more accurately in both subbasins. The Efficiency Index (EI) during this study in Skandari subbasin is 0.7 for simulating runoff based on the observed rainfall and 0.58 for simulating runoff based on the predicted rainfall. Also the Efficiency Index of this model in Qalehshahrokh subbasin for runoff simulation based on observed and predicted rainfall is 0.86 and 0.84 respectively.

**Keywords:** ANFIS, ANN, NAM Rainfall-Runoff Model, Rainfall prediction, Zayandehrood dam watershed



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