Abstract

An accurate prediction of sedimentation in dam reservoir is a challenging issue due to the complex and non-linear physics of the problem. Anyhow, soft-computing-based techniques showed great ability for predicting non-linear phenomena and have been used for different purposes. The main objective of this study is to estimate the volume of sedimentation in Karaj dam using a wavelet-ANFIS (WANFIS) and a wavelet-neural network (WANN) model. Monthly average flow is used to estimate monthly averaged suspended sediment load for a thirty-year period. The amount of bed load is computed based on the suspended sediment load and the river slope and the total volume of sedimentation in the reservoir is calculated with subtracting
the upstream (Karaj River) and downstream (Beylaghan River) total sediment load. In WANFIS and WANN models, monthly average flow time series are decomposed to several sub-time series using different wavelet decomposition levels. The total volume of sedimentation in Karaj dam obtained from different techniques such as WANFIS, WANN, ANFIS, ANN and hydrography are compared together. The comparison demonstrates that WANFIS model is superior to the other techniques. For WANFIS and WANN models, the best model is obtained by two and three wavelet decomposition levels respectively. Findings of this study reveal that Wavelet-ANFIS models can be applied as a successful tool to predict the volume of sedimentation.

References

- http://britishdams.org/about_dams/sedimentation.htm
- http://reference.wolfram.com/applications/neuralnetworks/NeuralNetworkTheory/2.5.1.html
- Gupta, K. K and Gupta, R. 2007. Despeckle and geographical feature extraction in SAR
images by wavelet transform. ISPRS J Photogramm, 62(6), 473–84.


**Index Terms**

Computer Science  
Information Sciences

**Keywords**

Wavelet Transform  
Neuro-Fuzzy System  
Neural Networks  
Suspended Sediment  
Dam Reservoir