IWRM2018-55
8th International Water Resources Management Conference of ICWRS

An improved PSO-RBF model for runoff prediction in Karst area, South China

Zhangjun Cao and Dong Wang

Nanjing university, School of Earth Sciences and Engineering, Department of Hydrosciences, China
(caozhangjun110@sina.com)

This paper applies a chaos-enhanced particle swarm optimization (PSO) technique for training the radial basis function (RBF) neural network to forecast runoff from the Houzhaihe River basin, a typical karst area in Guizhou Province, southwest China. The artificial neural network (ANN) model, instead of a physically based model, is applied because the rainfall-runoff process in karst areas is far more complicated than in other areas. Usually ANNs are trained with a back-propagation algorithm or a gradient algorithm, however, these algorithm suffer from very slow convergence and may converge to a local minimum. Particle swarm optimization (PSO) have therefore been introduced to improve the performance of ANN models. In order to improve the ANN performance for runoff forecasting, a hybrid particle swarm optimization PSO-RBF model was employed which is combined with a chaotic map with the ability to avoid converging to local optimum. The chaotic map was applied to improve the PSO algorithm. The approach was applied to predict runoff from Houzhaihe River basin. Meanwhile, the traditional RBF model without incorporation of the chaotic map and the one optimized through usual PSO algorithm were employed for comparison. Results of prediction by the three models indicate that, the chaos-enhanced PSO technique is a superior alternative for training of the RBF-ANN model.