Geophysical Research Abstracts
Vol. 12, EGU2010-13611-2, 2010
EGU General Assembly 2010

A hybrid SCE-KNN optimisation algorithm applied to the calibration of rainfall-runoff models

Hammouda DAKHLAOUI and Zoubeida BARGAOUI

Laboratoire Modélisation en Hydraulique et Environnement , Ecole Nationale d'Ingénieurs de Tunis, Tunis, Tunisia (hammouda.dakhlaoui@laposte.net)

The aim of this study is to improve the efficiency of the global optimisation algorithm SCE-UA, applied to the calibration of HBV and IHACRES Rainfall-Runoff models. Since the objective function estimation by model simulation is the time consumer in the optimisation algorithms, the reduction of the number of evaluation of objective function needed by calibration algorithm is an important way to improve its efficiency. We propose here to adopt the KNN technique to estimate the objective function. To that purpose, subsequently to a number of iterations generated by SCE-UA, a data-base of explored sets of parameter is constituted. As well, the corresponding objective functions are saved. Hence, this data-base is used to complete the estimation of the objective function by the K-nearest neighbour technique. To choose the situations where objective function will be estimated by model simulation rather than by KNN, decision criteria are fixed to perform a discrimination of the new generated point according its neighbors objective function values and the distance that separates it to its nearest neighbors. The algorithmic parameters of the KNN method are fitted automatically and updated periodically within SCE-UA running by the way of a secondary tunning algorithm. The enhanced algorithm is developed within several test functions (Ristrigin, Shekel, Griewang) and a synthetic model : Sixpar. It gives an improvement in efficiency of SCE-UA between 30% to 60%. This hybrid optimisation algorithm is tested then for the calibration of HBV and IHACRES models within synthetic data from Rottweil a tributary of Rhine (Germany). It proves an improvement of efficiency about more then 30%.

Keywords: KNN, Model calibration, Shuffled Complex Evolution, Optimisation, HBV modelRainfall runoff model