

Combining an improved harmony search algorithm with the One Tank Model calibration

MIAO-MIAO MA¹, WEI-MIN BAO¹ & XI-FENG LI²

*1 Department of Hydrology and Water Resources, University of Hohai, 210098 Nanjing, China
wenmiaowu@163.com*

2 The Administration of Yinhuangjiqing Project, Changyi Station, 261300 Weifang, China

Abstract Conceptual rainfall–runoff models that aim to predict streamflow have been used as a basic tool for hydrological forecasting. The Tank Model, which is a typical deterministic conceptual rainfall–runoff model, can yield good results for catchments of many regions in spite of its simplicity. The parameter calibration of the Tank Model is a very time consuming task and hence the demand for an automatic calibration method has been increasing. In this study, three meta-heuristic algorithms, i.e. Harmony Search, Improved Harmony Search and Global-best Harmony Search, are tested and numerical results reveal that IHS can find better solutions in comparison to HS and GHS. Detailed analysis shows that automatic calibration has the risk of outputting meaningless parameter values despite giving excellent results, if a single objective function is used to evaluate runoff simulation. Thus, multiple criteria are tested and the results show multiple criteria are feasible and easier to apply in practice.

Key words One Tank Model; automatic calibration; Harmony Search; Improved Harmony Search; Global-best Harmony Search; objective function