Estimating Optimum Parameters of Non-Linear Muskingum Model of Routing using Imperialist Competition Algorithm (ICA)

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Abstract

Non-linear Muskingum model is an efficient method for flood routing. However, the efficiency of this method is influenced by three applied parameters. Therefore, efficiency assessment of Imperialist Competition Algorithm (ICA) to evaluate optimum parameters of non-linear Muskingum model was addressed in this study. In addition to ICA, Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) were also used to find an available criterion to verify ICA. In this regard, ICA was applied for Wilson flood routing; then, routing of two flood events of DoAab Samsami River was investigated. In case of Wilson flood, the target function was considered as the sum of squared deviation (SSQ) of observed and calculated dischargem. Routing two other floods, in addition to SSQ, another target function was also considered as the sum of absolute deviations of observed and calculated discharge. For the first floodwater based on SSQ, GA indicated the best performance; however, ICA was in the first place, based on SAD. For the second floodwater, based on both target functions, ICA indicated a better operation. According to the obtained results, it can be said that ICA could be recommended as an appropriate method to evaluate the parameters of Muskingum non-linear model.

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