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Short-term scheduling of cascade reservoirs using an immune algorithm-based particle swarm optimization. (English) Zbl 1231.90191

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Summary: This paper presents a new approach for short-term hydropower scheduling of reservoirs using an immune algorithm-based particle swarm optimization (IA-PSO). IA-PSO is employed by coupling the immune information processing mechanism with the particle swarm optimization algorithm in order to achieve a better global solution with less computational effort. With the IA-PSO technique, the hydro-electrical optimization model of reservoirs is formulated as a high-dimensional, dynamic, nonlinear and stochastic global optimization problem of a multi-reservoir hydropower system. The purpose of the proposed methodology is to maximize total hydropower production. Here it is applied to a reservoir system on the Qingjiang River, in the Yangtze watershed, that consists of two reservoirs. The results are compared with the results obtained through conventional operation method, the dynamic programming and the standard PSO algorithm. From the comparative results, it is found that the IA-PSO approach provides the most globally optimum solution at a faster convergence speed.

MSC:

90B35 Deterministic scheduling theory in operations research

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Keywords:

cascade reservoirs; short-term operations; immune algorithm-based particle swarm optimization

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