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Comprehensive dispatch model of agricultural water resources based on multi-objective quantum genetic algorithm

Yaning Yan

School of Intelligent Science and Information Engineering, Xi'an Peihua University, Xi'an 710125, China, email: yyn1978@126.com

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ABSTRACT

In order to solve the problems of slow convergence speed, poor optimization effect, the large deviation between irrigation area and yield, and low water resource utilization rate, the integrated scheduling model of agricultural water resources based on a multi-objective quantum genetic algorithm is proposed. Taking the largest fully irrigated area and the largest crop yield as the optimization goals, construct a comprehensive scheduling model of agricultural water resources. On the basis of quantum genetic algorithm and multi-objective optimization algorithm, multi-objective quantum genetic algorithm is adopted, combined with real number coding of qubits, and quantum state interference characteristics are used to carry out probability crossover. According to the non-dominant sorting group classification mechanism and the non-inferior solution level sorting population classification, multi-objective optimization strategies such as elite retention and hierarchical clustering are used to solve the comprehensive scheduling model of agricultural water resources and realize the comprehensive scheduling of agricultural water resources. The experimental results show that the deviation of irrigation area proportion and irrigation yield of the proposed algorithm is small, and the optimization effect is good, which can effectively improve the utilization rate of water resources and accelerate the convergence speed.

Keywords: Multi-objective quantum genetic algorithm; Quantum genetic algorithm; Multi-objective optimization algorithm; Quantum bit coding