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Multi Objective Multireservoir Optimization in Fuzzy Environment for River Sub Basin Development and Management

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ABSTRACT

In this paper, a multi objective, multireservoir operation model is proposed using Genetic algorithm (GA) under fuzzy environment. A monthly Multi Objective Genetic Algorithm Fuzzy Optimization (MOGAFU-OPT) model for the present study is developed in 'C' Language. The GA parameters i.e. population size, number of generations, crossover probability, and mutation probability are decided based on optimized values of fitness function. The GA operators adopted are stochastic remainder selection, one point crossover and binary mutation. Initially the model is run for maximization of irrigation releases. Then the model is run for maximization of hydropower production. These objectives are fuzzified by assuming a linear membership function. These fuzzified objectives are simultaneously maximized by defining level of satisfaction (?) and then maximizing it. This approach is applied to a multireservoir system in Godavari river sub basin in Maharashtra State, India. Problem is formulated with 4 reservoirs and a barrage. The optimal operation policy for maximization of irrigation releases, maximization of hydropower production and maximization of level of satisfaction is presented for existing demand in command area. This optimal operation policy so determined is compared with the actual average operation policy for Jayakwadi Stage-I reservoir.

KEYWORDS

Optimization, Multi Objective Analysis, Multireservoir, Genetic Algorithms, Fuzzy Logic, Reservoir Operation

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