Optimization of Dez Dam Reservoir Operation Using Genetic Algorithm

Authors : Alireza Nikbakht Shahbazi, Emadeddin Shirali

Abstract : Since optimization issues of water resources are complicated due to the variety of decision making criteria and objective functions, it is sometimes impossible to resolve them through regular optimization methods or, it is time or money consuming. Therefore, the use of modern tools and methods is inevitable in resolving such problems. An accurate and essential utilization policy has to be determined in order to use natural resources such as water reservoirs optimally. Water reservoir programming studies aim to determine the final cultivated land area based on predefined agricultural models and water requirements. Dam utilization rule curve is also provided in such studies. The basic information applied in water reservoir programming studies generally include meteorological, hydrological, agricultural and water reservoir related data, and the geometric characteristics of the reservoir. The system of Dez dam water resources was simulated applying the basic information in order to determine the capability of its reservoir to provide the objectives of the performed plan. As a metaexploratory method, genetic algorithm was applied in order to provide utilization rule curves (intersecting the reservoir volume). MATLAB software was used in order to resolve the foresaid model. Rule curves were firstly obtained through genetic algorithm. Then the significance of using rule curves and the decrease in decision making variables in the system was determined through system simulation and comparing the results with optimization results (Standard Operating Procedure). One of the most essential issues in optimization of a complicated water resource system is the increasing number of variables. Therefore a lot of time is required to find an optimum answer and in some cases, no desirable result is obtained. In this research, intersecting the reservoir volume has been applied as a modern model in order to reduce the number of variables. Water reservoir programming studies has been performed based on basic information, general hypotheses and standards and applying monthly simulation technique for a statistical period of 30 years. Results indicated that application of rule curve prevents the extreme shortages and decrease the monthly shortages.

Keywords : optimization, rule curve, genetic algorithm method, Dez dam reservoir

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