

Real-Time Operation of Reservoir System by Genetic Programming

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Received: 5 March 2012 / Accepted: 27 August 2012
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Abstract Reservoir operation policy depends on specific values of deterministic variables and predictable actions as well as stochastic variables, in which small differences affect water release and reservoir operation efficiency. Operational rule curves of reservoir are policies which relate water release to the deterministic and stochastic variables such as storage volume and inflow. To operate a reservoir system in real time, a prediction model may be coupled with rule curves to estimate inflow as a stochastic variable. Inappropriate selection of this prediction model increases calculations and impacts the reservoir operation efficiency. Thus, extraction of an operational policy simultaneously with inflow prediction helps the operator to make an appropriate decision to calculate how much water to release from the reservoir without employing a prediction model. This paper addresses the use of genetic programming (GP) to develop a reservoir operation policy simultaneously with inflow prediction. To determine a water release policy, two operational rule curves are considered in each period by using (1) inflow and storage volume at the beginning of each period and (2) inflow of the 1st, 2nd, 12th previous periods and storage volume at the beginning of each period. The obtained objective functions of those rules have only 4.86 and 0.44 % difference in the training and testing data sets. These results indicate that the

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