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Optimal Maintenance and Improvement Policies in Water Distribution System: Markov Decision Process Approach

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Abstract : The Markov Decision Process (MDP) based methodology is implemented in order to establish the optimal schedule which minimizes the cost. Formulation of MDP problem is presented using the information about the current state of pipe, improvement cost, failure cost and pipe deterioration model. The objective function and detailed algorithm of dynamic programming (DP) are modified due to the difficulty of implementing the conventional DP approaches. The optimal schedule derived from suggested model is compared to several policies via Monte Carlo simulation. Validity of the solution and improvement in computational time are proved.

Keywords : Markov decision processes, dynamic programming, Monte Carlo simulation, periodic replacement, Weibull distribution
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