

Optimal maintenance and improvement scheduling of water main system using Markov decision process

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Water main system causes a severe inconvenience throughout the wide region when failure occurs. Unlike other facilities, direct inspection of water main system is a time and money consuming task, since it is buried underground deeply. There are several actions to prevent water main system from failure, and exact scheduling of those actions can minimize the opportunity cost. A mathematical model which explains the deterioration of a single pipeline is considered. By discretizing the continuous model, model can be considered as Markov process. The Markov decision process which decides the optimal action set within the frame of discretized model is solved by dynamic programming algorithm. The optimal schedule of a single pipeline is then extended to pipeline network system. Decision framework can be operated without background knowledge of physical properties of pipeline. An example problem is solved to demonstrate the suggested guideline.