

## Optimization model for water distribution network considering minimization of total replacement cost and stabilization of flow velocity in pipelines

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### ABSTRACT

This study proposes a method using genetic algorithms (GA) to optimize selection of appropriate pipe diameter during pipeline replacement planning for water distribution networks. Mathematical programming problems were first formulated to minimize cost of replacement while considering hydraulic constraints such as flow velocity for each pipe and water pressure at each node. In addition to the economic perspective, stability of flow velocity in pipes was considered as another objective function of the multipurpose programming problem. After this, a GA model combined with hydraulic pipe network analysis was created: the HGA model. Finally, a case study was conducted to show the validity of the proposed model. Results reveal that this multipurpose HGA model is useful for optimization of pipeline replacement planning.

*Keywords:* Water distribution network; Replacement planning; Optimization; Multipurpose; Genetic algorithm

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