Comparing the competitive evolutionary algorithms for optimization of sewer pipe networks

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Abstract

In recent decades, evolutionary optimization algorithms have been successfully applied for a wide variety of water resources engineering problems and these applications are increasingly continuing. In this research work, different state of the art algorithms including: Genetic algorithm (GA), Particle Swarm Optimization (PSO), and Harmony Search Algorithm (HS) are studied for assigning the optimal rehabilitation plan of pipe sewer networks.

These algorithms are linked to the SWMM-EPA hydraulic model and are applied to a storm sewer pipe network case study in Seoul city to obtain the best rehabilitation scheduling for pipe replacements. Recently, it has been revealed that this area has had flood overflow problems owing to urbanization growth and small predefined storm design. The results of the considered algorithms are compared with each other in terms of the best, the worst, the mean and the standard deviation of solutions obtained; and also according to the number of function evaluations. Finally, the flexibilities of different algorithms are discussed and the best algorithm is represented based on the proposed metrics.

Keywords: Evolutionary, Optimization, Storm, Sewer pipe network, GA, PSO, HS

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