



Automated Pipe-sizing of Storm Sewer or Combined Sewer Systems Based on Hydrodynamic Modelling

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ABSTRACT

This paper introduces a method for automated pipe-sizing of storm sewer or combined sewer systems based on hydrodynamic modelling. The methodology includes three steps. Initially, graph theoretical description of network topology (e.g. Strahler number) is utilized for classification of the studied sewer network's topology. Then, the network is decomposed hierarchically into a number of subsystems based on the network topology. Finally, the pipe sizing is carried out subsystem by subsystem with no flooding in the whole system as the objective. To verify the results of the method, the algorithm is tested on a real world sewer network, and then the solution is compared with the global optimal solution. As proved by the case study, the author-designed method could guarantee a near-optimal solution that is very close to the global optimal solution, while requires dramatically less computational effort than global optimization method. Compared with evolutionary methods, the method has its own advantages, since it does not require any parameter for configuration and execution control, and could produce unique solutions as long as the design principles are fixed.

KEYWORDS

Automated pipe-sizing; combined sewer system; hydrodynamic modelling; storm sewer system; SWMM