An Interface for Coupling Optimization Algorithms With EPANET in Discrete Event
Simulation Platforms

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Abstract:
The application of simulation optimization in water distribution network analysis and design is a promising method for generating solutions to existing challenges. The absence of a standard interface for coupling the open source EPANET software package to optimization algorithms increases the implementation effort and limits the comparison of results. This work presents a methodology for implementing an interface for coupling optimization algorithms with EPANET. The proposed technique uses the internal simulation clock events in a discrete event simulation platform to co-ordinate optimization loops and data exchange. The utilization of intermediate input/output files is avoided in order to increase the simulation speed. A water distribution network implemented in the EPANET solver is considered as a discrete event to be interfaced with optimization algorithms. The interface module is implemented as a C/C++ mex-file for EPANET in the MATLAB/Simulink platform. The methodology enables the user to evaluate the fitness of the design parameters with easy access to data logging and visualization tools at run-time. The proposed technique is used to implement the particle swarm optimization algorithm (PSO) and applied to design a benchmark water distribution network.