Collaborative based pollution sources identification algorithm in water supply sensor networks

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ABSTRACT

Arranged water quality sensors at key nodes or water sources in water supply network to achieve real-time monitoring can prevent water pollution incident. However, when pollution incident occurs, to use the information collected by the water quality sensors to accurately locate and predict the location of pollutants (injection time, injection duration and injection quality) is a challenging problem. In this paper, the simulation optimization method which is the currently popular pollution source identification method is conducted an in-depth analysis and found that identification of pollution source in water supply network is an expensive optimization problem. So, the pollution source identification problem is converted into an expensive optimization problem in this paper. According to the characteristics of the problem, a collaborative based expensive optimization algorithm is proposed. According to the characteristics of water supply network, this algorithm proposes a more suitable strategy for each different variable to guide the search direction of the algorithm. The algorithm uses Gaussian surrogate model as much as possible to ensure the identification accuracy. Finally, through simulation experiment, the validity, efficiency and stability of the proposed algorithm is verified.

Keywords: Pollution sources identification; Simulation optimization; Gaussian surrogate model; Collaborative based algorithm

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