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Consumption management in water distribution systems by optimizing pressure reducing valves' settings using genetic algorithm

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ABSTRACT

In this paper an optimization approach is presented to minimize pressure and consequently water consumptions in water distribution networks using Genetic Algorithm (GA) technique. To reduce water consumption a pressure management scheme is considered which uses pressure reducing valves (PRVs). When the PRV outlet head is reduced pressure is decreased in the down stream. This leads to reduction of all uncontrolled output flow from the system (e.g. leakage or sprinkler outlets) and the unwanted consumption by the ordinary customer which is usually happened by excess pressure in the system. In this procedure PRV outlet setting is decision variable of the optimization model. To evaluate pressure values of the system resulted from different PRV's settings an extended period head driven simulation program (EXPHDA) is prepared and is linked to the optimization model. Finally a test network is considered to apply the proposed methodology. It is shown that how much the real consumption is reduced when using the optimum PRVs' settings.

Keywords: Consumption management; Water distribution networks; Pressure; Hydraulic analysis; PRV; Genetic algorithm

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