

## Using Jumping Particle Swarm Optimization for Optimal Operation of Pump in Water Distribution Networks

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**Abstract :** Carefully scheduling the operations of pumps can be resulted to significant energy savings. Schedules can be defined either implicit, in terms of other elements of the network such as tank levels, or explicit by specifying the time during which each pump is on/off. In this study, two new explicit representations based on time-controlled triggers were analyzed, where the maximum number of pump switches was established beforehand, and the schedule may contain fewer switches than the maximum. The optimal operation of pumping stations was determined using a Jumping Particle Swarm Optimization (JPSO) algorithm to achieve the minimum energy cost. The model integrates JPSO optimizer and EPANET hydraulic network solver. The optimal pump operation schedule of VanZyl water distribution system was determined using the proposed model and compared with those from Genetic and Ant Colony algorithms. The results indicate that the proposed model utilizing the JPSP algorithm outperformed the others and is a versatile management model for the operation of real-world water distribution system.

**Keywords :** JPSO, operation, optimization, water distribution system

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