

# DAE Index and Optimization in Pressurized Water Networks

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**Abstract:** We consider operative planning problems in pressurized water networks. The hydraulic model leads to a large-scale DAE with piecewise continuous data where the set of control variables may change at the grid points. Our analysis of the structural properties asserts that the DAE is either uniformly index-1 or intractable, depending on the network topology. We then discuss implications on discrete time boundary value problems arising in operative planning, and address the issue of binary decisions (pump switching) in the discrete-continuous decision problem. For the municipal water supply network of Berlin, we finally present results of minimum-cost operation under reliable demand forecast.

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