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**Bounds and convex heuristics for bi-objective optimal experiment design in water networks.**

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Summary: Optimal Experiment Design for parameter estimation in water networks has been traditionally formulated to maximize either hydraulic model accuracy or spatial coverage. Because a unique sensor configuration that optimizes both objectives may not exist, these approaches inevitably result in sub-optimal configurations with respect to one of the objectives. This paper presents a new bi-objective optimization problem formulation to investigate the trade-offs between these conflicting objectives. We develop a convex heuristic to approximate the Pareto front, and compute guaranteed bounds to discard portions of the criterion space that do not contain non-dominated solutions. Our method relies on a Chebyshev scalarization scheme and convex optimization. We implement the proposed methods for optimal experiment design in an operational water network from the UK. For this case study, the convex heuristic computes near-optimal solutions for the individual objective minimization problems, and tight bounds on the true Pareto front of the considered bi-objective optimization problem.

**MSC:** 90Bxx Operations research and management science

**Keywords:** optimal experiment design; multi-objective optimization; water distribution networks

**Software:** JuMP

**Full Text:** DOI arXiv

**References:**


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