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Evaluation of heuristic search methods for water distribution systems optimization

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Using of the heuristic search methods is very popular in various water resources management problems and it is being applied on different single and multi-objective tasks. Especially when multi-objective optimization tasks are solving there is in some applications smoky possibility evaluate how close particular method gets to global optimum. For instance popular paradigm in optimal design of the water distribution systems is that from “real-life” point of view it is actual only solve multi-objective task for instance parallel optimization of reliability and price of the water distribution networks. Results of this are Pareto fronts. Nevertheless, the same algorithms used in these tasks have problems to be reliable in finding even single objective solution for larger networks, which is only one value, not Pareto front as in previous case – it means simpler task.

Because there is still some uncertainty, how close some heuristic method gets to a global optimum authors make several evaluations and comparison of selected methods. Testing of this is based mainly on following idea: for the various heuristic methods (GA, PSO, Harmony search, Tabu search etc.) it does not matter if it resolves a looped or branched network. By means of these methods it is possible to optimize both of these configurations. For the purpose of testing, heuristic methods could be used for resolving a large branched network. The same network is possible to resolve also with linear programming. Because the result from the linear programming is without doubt a global minimum, it could be seen how close various heuristic search methods gets to this goal.