[DWESD]

Interactive
comment

Interactive comment on "All-in-one model for designing optimal water distribution pipe networks" *by* Dagnachew Aklog and Yoshihiko Hosoi

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First, I would like to thank the referee for taking time to review this paper and providing us with valuable and constructive comments.

The major concerns of the referee are practicality of the all-in-one model and innovation of the study.

Pipe network optimization has been extensively studied in the past. Virtually all optimization techniques have been applied and numerous models were developed. But practical application has been limited. As mentioned in the paper, one of the main reasons for this limited application is the complexity associated with the use of the models;

most models are just research tools which can only be used by the researchers who developed them. In our study, we addressed this problem by developing a easy-to-use user-interface so that the models can be used for practical purposes as assisting tools by distribution network designers who are not even familiar with optimization techniques. While this is not a new finding or innovation as such, the authors believe this will have practical significance in designing cos-effective pipe networks.

The other issue with application of optimization methods for practical purposes is the quality of the results since optimal solution cannot be attained except for branched networks. However, the authors believe results generated by mathematical models will, in most cases, be better than those obtained through the conventional trial-and-error approach. Therefore, quality of results should not be a serious concern to use the all-in-one model as an assisting tool for practical design purposes.

Having said that, the authors agree that the all-in-one model should be tested on real-world problems to be sure about its practicality. We will do this as soon as we can.

To respond to specific comments: 1) Regarding originality, although there are some technical improvements in the algorithms, the main contribution is making the models easy-to-use for anyone who is not even familiar with optimization techniques.

2) Regarding the GA parameters, it is true that by its nature GA is sensitive to many of the parameters. In our model, there are default values for each parameter but there is no guarantee they are the best. The user should made some preliminary runs to adjust the parameters. Here, results of the OBORM, which is less sensitive and has much less number of parameters, can be used as as reference.

3) Regarding comparison of results, the designer can either compare the model results with his/her own judgement or among themselves. That is the only way to go for a new problem with unknown solution.

4) Regarding multi-objective optimization, including network reliability into pipe network

optimization is a great idea but it causes a huge computation burden and thus can make the model inefficient for practical applications. The OBORM has been previously used by the authors for reliability-based optimal design of water distribution networks. It can handle the problem but efficiency will be an issue.

5) If there are better methods of handling constraints in GA than the use of penalty function and if these methods are appropriate for the pipe network optimization, the authors are ready to incorporate them in future versions.

6) We fully accept the comment and totally agree that the model should be tested on real-world case studies and we will do that as soon as we can.