

## Response to Interactive Comments of Anonymous Referee #1

I'd like to thank you so much for your guidance, you gave me motivation to work and you supported my ideas and results. Also your questions and notices offer me a brainstorming way to solve them. Thank you for your encouragement advices and suggestions, I really appreciate your precious time you took to help me with this and in the following my response to your comments.

Abstract: it is really not clear what the purpose of the work is, what the scientific contribution is and how the proposed methods are chosen.

The abstract is adapted to clear:

(1) The purposes:

- 1- Investigate the effect of leakage on the different nodal pressure in the network
- 2- Determination the most affected nodes due to the leakage
- 3- Studying the effect of varying the location of leakage and its flow rate
- 4- Adapt the system to close all possible pipelines connect the floe to the leakage position
- 5- Investigate the response of the solenoid valve

(2) The scientific contribution: figure out the leakage effect on the performance of the water distribution network and scientific estimation of the leakage effect according its position and rate.

(3) The method: due to the difficult application on the real network so a similitude model is designed and fabricated to facilitate the experimental investigation of the leakage effect, also the computational investigation enables further understanding.

The English needs to improve significantly, as there are too many to list structural, grammatical and typological errors. The language used in the paper is a bit 'flowery', starting from the first sentence of the abstract. The abstract and so the paper should be restructured to clearly motivate what the engineering/societal objective is; there is a large set of literature on leakage detection using various methods, which can be references to clearly set the context. Then the choices of experiments and method should be justified.

The manuscript is edited for proper English, grammar, punctuation, spelling by one or two of the highly qualified native English speakers at the Cambridge Proofreading Group (the certification of proofreading is attached). Also, the introduction become more specific to the paper objective. The paper is restructured to be clear by the sections from 2 to 7 are combined into one section under title materials and methods.

Brevity and unsuggested language is more appropriate when discussing health risks associated with microbial contamination.

Done

I suggest a review of language used, typos, and grammar.

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It is really not clear what such a scaled experiment adds, the claim that WDN real leakage tests are difficult and so building a lab model brings more value is not valid.

Due to the difficult and impossible application of the leakage study on the real water distribution network, so a particular similitude model with accurate geometric and dynamic with kinematic similarities is designed and fabricated to facilitate the experimental investigation of the leakage effect, even it gives approximate results it is considered a good conclusion.

In fact, leak detection and localisation methods with distributed sensors in the real network and with simulation of the real system are successfully applied in practice (as demonstrated by numerous manuscripts in literature). - why is a Hardy-Cross method used when there are free, modern alternatives that even allow pressure driven leakage simulations in milliseconds (eg. EPANET, WNTR, etc).

Hardy-Cross method is just a theoretical method to calculate the flow rates in the pipelines which is used to estimate the flow rates in the pipelines before the study. After the theoretical calculations, the experimental work emphasizes the theoretical results. Finally the CFD technique is used instead of EPANET which gives accurate simulations in seconds.

It is not clear what these are: ancient WDN, dispersed sensors, the pressure numbers, etc?

These words and sentences are edited to be clear

Ancient mean old, dispersed mean distributed. Numbers mean values.

The paper seems to mix up leak detection using transient methods with steady state approaches using pressure sensors, and control of solenoid valves. - what is really the proposed 'new technique' of investigation the water leakage effects on the water distribution network performance.

The study is steady state only

New is deleted

What is the leakage localisation method in Figure 5.

The leakage localization was determined in all possible and different configurations, geometry, position, alignment and dimensions such that the pipeline is parallel or perpendicular, exterior or interior, main or sub-main.

Although the paper may potentially have some useful contributions, the structure and quality of the writing makes it difficult to grasp what the contributions are, what has been done and why, and what the relationship is with the rich recent literature on leakage diagnosis and localisation.

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