

## Response to Interactive Comments of Anonymous Referee #2

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.

The authors performed an experimental and numerical investigation on leakage behavior, influenced by pipe geometry and hydraulics.

Q1. Rewording would be to improve the quality of the paper and make it easier to read. For instance, the Introduction section is difficult to follow/read. It should be re-written to be less general and to provide more specific information directly linked to the objectives of the paper.

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.

Q2. Sections 2 (theoretical background), 3 (experimental work), 4 (numerical simulations), 5 (experimental error and uncertainty analysis) and one part of the section 7 (Matlab simulation of solenoid valve) should be combined into one section (Materials and methods). This section should be written so that the reader has a better understanding of how the research was performed.

Sections from 2 to 7 are combined into one section under title materials and methods.

Q3. The number of Figures and Tables should be reduced both in Materials and methods and Results sections.

The number of figures are reduced

Q4. When the results are presented, less general comments should be made and specific comparisons with the literature should be made.

Less general comments are made. The obtained results of this research are matched with good agreement with literature results in phenomenon and observation and conclusions but the mathematical values are difficult to be compared due to the differences of application.

Q5. Overall: The idea of the paper is interesting, but the authors should consider re-writing it to meet the standards of DWES Journal. Specific comments are given below:

The manuscript has proof reading taking into consideration the standard of DWES.

Q6. Line 12 How is leakage behaviour considered life-threatening?

In this sentence the authors want to show the disadvantage of the leakage in the water distribution network such that it causes a great loss of the limited amount of the available drinking water in the world and in case of great leakage it possible to cause life threatening of peoples.

Q7. Line 15: Spelling errors: consideration and geometry. There are other typos further in the text. Therefore, general spelling and grammar check is also essential.

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).

Q8. Line 24 - 25 The sentence is not clear, please rephrase. What do you mean by ancient?

Ancient is replaced by old to explain that one of the manuscript applications on the pipeline network constructed from several years with old technology and in the present can't withstand the loads. The sentence is rephrased.

Q9. Line 31- 33 The sentence is not clear, please rephrase.

The sentence is rephrased.

Q10. Line 38 – 118 – As given in general comments, the Introduction section should be re-written in order to be less general and to provide more specific information directly linked to the objectives of the paper.

The introduction become more specific to the paper objective

Q11. Line 136: The Figure belongs to Experimental work.

The figure is added to the experimental work section

Q12. Section 6, first paragraph (there are no text lines that I could refer to): This is summary of your methodology, not results.

This paragraph is re-written in methodology section and deleted from results.

Q13. Line 145: Combine Fig 2, 3, 4 into one Figure.

Figures 2, 3 and 4 are combined in figure 2

Q14. Line 150: Table 1 is better suited for Supplementary information.

Table 1 is very important to the readers of the manuscript and journal because it is the specifications of the used flow meter sensor, pressure sensor, and solenoid valve in the experimental work

Q15. Line 165: Use a capital letter for the sub-section title.

Done

Q16. Line 228: Combine Figure 1 and Figure 7 into one.

Done

Q17. Line 236 – 256: This is too detailed, please put it into Supplementary information.

This section explains the mesh grid stability of the CFD and it reduced and shortened in two lines.

Q18. Line 257: You have introduced Experimental error and uncertainty analysis. However, the uncertainty was not discussed in the paper; and you only briefly discussed the experimental error. Please provide more info regarding this.

The uncertainty words are eliminated due to it didn't studied

Q19. Line 268: Table 3 is better suited for Supplementary information, but the error should be discussed in the paper.

Table 3 only shows the accuracy, range and error of the used devices

Q20. Line 270 – 384: As given in general comments, the number of Figures and Tables should be reduced. When the results are presented, less general comments should be made and specific comparisons with the literature should be made.

Done

Q21. Line 271: What do you mean by validation in Figure caption? It looks more like a comparison. Also, combine Figure 10 and Figure 11 into one.

Validation is replaced by comparison

Figs 10 and 11 are the responses of nodes in different pipelines with different response so they are separated.

Q22. Line 272: It is evident from the Figure 11, that experimental and numerical results for the point 12 are considerably different. However, this was not explained in the text. Please include an explanation here.

The explanation is included in the text as (Node 12 was the highest pressure-drop affected node due to the leakage flow rate variations at the main pipeline of the distribution network. Also at this node the differences between the numerical and experimental results are great due to, in experimental test the flow pressure is supported from flows of different loops to substitute the pressure drop but numerically this phenomenon can't be simulated and the mathematical equations calculate and iterate the negative pressure drop. Node 12 location was aligned with outlet leakage 15 and was the nearest node to this outlet).

Q23. Line 287: combine Figure 12 and Figure 13 into one (also further in the paper do the same).

It is preferred to separate the response of nodes at different pipelines because the difference is obvious if the pipeline parallel or perpendicular, exterior or interior, main or submain so it should be separated.

Q24. Line 385 – 410 – These lines belong to the Material and method section.

Done

Q25. Line 421: What do you mean by small?

Small means very very tiny leakage amounts but with long time it will be effective

Q26. Line 422 - 423: Have you calculated "leakage amount of water"? If yes, please specify.

No, the leakage didn't calculate.

Q27. Line 426 – 448 – This is more summary and observations, rather than conclusions. Please specify what you can conclude from your observations (results).

The conclusion is modified to be specific.

Q28. Line 442 – 444 –First you include/discuss this in the discussion part, and only then you can put it into conclusions.

This part is removed from conclusion.