Numerical and experimental investigation of leaks in viscoelastic pressurised pipe flow: short period analysis, by S. Meniconi, B. Brunone, M. Ferrante, and C. Massari

***Reply* to Referee #2 (P. S. H. Kim)**

This paper presents transient pressure signal for a reservoir pipeline valve system with a leakage. Both experimental result and numerical modeling for visco-elastic behavior of pipeline are explored on the context of leakage impact to pressure variation. Paper looks well organized and written in concise expression. However, reviewer has one comment for the viewpoint of this paper and a couple of minor suggestions to improve the clarity of paper.
Comment. One of main results of this paper seems the comparison of modeling to experimental data in three different models. Of course, reviewer agrees that the consideration of unsteady friction improve the pressure prediction and R2 can be a criterion for model performance. However, the potential for leakage detection (e.g. location and leak quantity) can be not always match with R2. As authors noted in Figures 4 and 5, leak location is related to the wave speed travel time to reflection point and the leak quantity seems the amplitude of damping at reflection point. Oftenly, the first wave reflection is most important ($t<2L/a$) in leak detection and more and more discrepancy tend to be accumulated in later time step. Even though further leak calibration in less accurate model provides higher fitness (e.g. RMSE) in leak optimization, potential for detection of location can be more or less similar to more accurate model.

Reply: We thank Professor Kim for the attention he paid to our work and the interesting comments.
We completely agree with Professor Kim. In fact we think that the most reliable transient test-based techniques are those in which a short period analysis is considered (i.e., when attention is focused on the first characteristic time of the pipe). However, if a fast manoeuver can not be executed, a long period analysis has to be carried out. In such a context, the numerical model has to simulate properly also the successive phases of the transient.

Suggestions
1. Fig. 1: In reviewer's experience, elastic pipe also showed sharp pressure response in rapid valve closing action. Fig 1(b) looks the pressure signal generated relatively slow action of valve to those for Fig 1(a) and 1(c). Please specify valve closure times for these cases.

Reply: We completely agree with Referee #2. In the revised version of Fig. 1 we will consider a fast manoeuver also to show the characteristics of transients in elastic pipes. In other words, in the revised version of Fig. 1 all very fast (i.e. almost instantaneous) manoeuvers will be examined.

2. Section 5: It may be better to specify whether authors used Vardy and Brown (2003) approach or Brunone (1991) or Pezzinga (2000) methods. It would be more interesting if author add some more discussion for features of both modeling approach. Simple because both cases have their own strengths which can be slightly different to each other.

Reply: In the paper the Instantaneous Accelerations-Based (IAB) model proposed by Brunone et al. (1991, 1995) has been used to evaluate unsteady friction. We completely agree with Referee #2 about the interest of comparing the different approaches to simulate unsteady friction but in our opinion such a task is beyond the scope of this paper.