

UKWIR Project WM08S211

Combining transient & steady state methods for acoustic leak detection

Need for project

Leakage is one of the key challenges facing the water industry and UKWIR have an ambitious aim of “achieving zero leakage in a sustainable way by 2050”. This aspirational target cannot be achieved with existing processes, techniques and equipment, so UKWIR have developed a strategic programme of research projects to address this.

One area is investigating leak detection and location methods and UKWIR are working with the University of Southampton on fundamental research, specifically exploiting acoustic and vibration detection methods. This builds on gap analysis work previously carried out by the University. The research is being progressed via a number of PhD projects which feed into the UKWIR Zero Leakage 2050 programme. One of these projects is summarised below.

Project overview and objectives

The effectiveness of acoustic leak detection is restricted for plastic pipes due to the high attenuation of the acoustic signals. Methods may be classified into two categories: 1) Detection of the transient signal that occurs during the burst process when the leak first occurs; 2) Detection of the continuous steady state signal that occurs after the burst process. This project will compare the two methods such that they might ultimately be combined to provide a more powerful approach. The following will be investigated: -

- Comparison of the different spectral energy in the transient signal with the subsequent steady state signal
- Sensor deployment for the simultaneous detection of transient and steady state leak signals

- Signal Processing methods for the simultaneous detection of transient and steady state leak signals

Industrial assistance for this project has been provided by Thames Water and Syrinix Ltd.

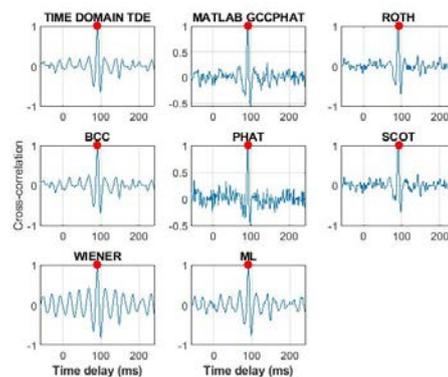


Figure 1. Example Time Delay Estimators

Work programme and timetable

This 4-year PhD commenced in late 2018 and is due for completion in 2022. The first year comprised taught courses, a group design project and a mini individual research project. During years 2-4, the main body of the PhD research will be carried out, including: analysis of real data acquired on the network; analysis of data acquired at UK and international test sites; and acquisition and analysis of data in a controlled laboratory environment.

Benefits

Improving the detection of both the location of the leak and also (potentially) the type of pipe. Improved guidance for the Industry on sensor deployment to ultimately lead to more timely and efficient fixing of leaks.



Project team

This research is being carried out by Ndubuisi Uchendu at the Institute of Sound and Vibration Research at the University of Southampton under the supervision of Dr Jen Muggleton. The UKWIR Programme Lead is Jeremy

Heath, SES Water, with support from Dennis Dellow, UKWIR Technical Lead for Leakage and UKWIR Project Management by Rebecca Haylock.