



Leak detection through wavelet analysis of pressure measurement for injected pressure for a simple pipeline system

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ABSTRACT

An effective leak detection method is one of the most demanding techniques for the management of water distribution systems. A leak detection scheme with pressure wave analysis using a rapid manipulation of hydraulic boundary conditions is not always suitable owing to substantial pressure variation, which can result in undesirable consequences for pipeline systems. The introduction of a relatively small pressure pulse through a regulated pressure generator can substantially diminish the potential damage of high- or low-pressure surges. Wave reflection due to the leakage boundary condition can be useful for predicting the leak location based on the time-domain reflectometry of the pressure signal. Further elaborate analysis for leak detection can be performed using wavelet analysis of the pressure signal, which provides leak response features in the time/frequency domain. Two distinct experimental conditions were employed to illustrate the impact of resonance on the hydraulic structure, such as a pressurized tank. The developed method demonstrates the potential of leak detection in a laboratory-scale pipeline system.

Keywords: Pipeline system; Leakage detection; Pressure generator; Wavelet analysis

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