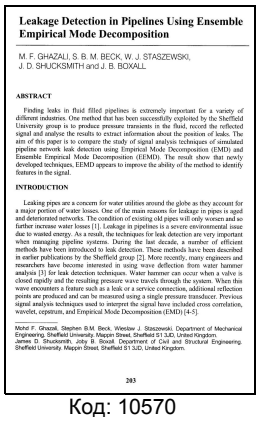

Leakage Detection in Pipelines Using Ensemble Empirical Mode Decomposition

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ABSTRACT

Finding leaks in fluid filled pipelines is extremely important for a variety of different industries. One method that has been successfully exploited by the Sheffield University group is to produce pressure transients in the fluid, record the reflected signal and analyse the results to extract information about the position of leaks. The aim of this paper is to compare the study of signal analysis techniques of simulated pipeline network leak detection using Empirical Mode Decomposition (EMD) and Ensemble Empirical Mode Decomposition (EEMD). The result show that newly developed techniques, EEMD appears to improve the ability of the method to identify features in the signal.

INTRODUCTION

Leaking pipes are a concern for water utilities around the globe as they account for a major portion of water losses. One of the main reasons for leakage in pipes is aged and deteriorated networks. The condition of existing old pipes will only worsen and so further increase water losses [1]. Leakage in pipelines is a severe environmental issue due to wasted energy. As a result, the techniques for leak detection are very important when managing pipeline systems. During the last decade, a number of efficient methods have been introduced to leak detection. These methods have been described in earlier publications by the Sheffield group [2]. More recently, many engineers and researchers have become interested in using wave deflection from water hammer analysis [3] for leak detection techniques. Water hammer can occur when a valve is closed rapidly and the resulting pressure wave travels through the system. When this wave encounters a feature such as a leak or a service connection, additional reflection points are produced and can be measured using a single pressure transducer. Previous signal analysis techniques used to interpret the signal have included cross correlation, wavelet, cepstrum, and Empirical Mode Decomposition (EMD) [4-5].

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Ключевые слова:

Содержание.