

주성분 분석을 이용한 상수도 관망의 누수감지  
Leak Detection in a Water Pipe Network Using the Principal  
Component Analysis

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**Abstract**

In this paper the potential of the Principle Component Analysis(PCA) technique that can be used to detect leaks in water pipe network blocks was evaluated. For this purpose the PCA was conducted to evaluate the relevance of the calculated outliers of a PCA model utilizing the recorded pipe flows and the recorded pipe leak incidents of a case study water distribution system. The PCA technique was enhanced by applying the computational algorithms developed in this study. The algorithms were designed to extract a partial set of flow data from the original 24 hour flow data so that the variability of the flows in the determined partial data set are minimal. The relevance of the calculated outliers of a PCA model and the recorded pipe leak incidents was analyzed. The results showed that the effectiveness of detecting leaks may improve by applying the developed algorithm. However, the analysis suggested that further development on the algorithm is needed to enhance the applicability of the PCA in detecting leaks in real-world water pipe networks.

*Key words:* Principle Component Analysis, water pipe network, leak, computational algorithm, flow data

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