

On-line Fault Detection and Location of Water Pipe Networks based on Negative Pressure Wave

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Water pipelines are generally installed underground and once they are equipped, the pipeline conditions are difficult to estimate even if pipe leak or burst happen. Accordingly, post management is often delayed, thus increasing the loss of pipelines. Therefore, a systematic fault management system of water pipe network is required to prevent pipe leak and burst. We develop on-line fault detection and location system of water pipe networks using water pressure data. First, we collect the pressure data at measurement points in the pipe networks. Then the gathered data are filtered using exponentially weighted moving average filter. Then, the fault detection and diagnosis algorithm is applied to the filtered data. We here use Cumulative sum technique to detect a leak. If leaks are detected, then an alarm is issued and the alarmed time is recorded. The information of the recorded time is transferred to fault diagnosis algorithm. In the diagnosis algorithm, nodes of water pipe networks should be first selected. We can find the leak location by using the detection results, wave speed, and distances between nodes. The presented system is validated with field data.