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ABSTRACT

PRESENTATION

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A PRELIMINARY STUDY ON PIPE WALL THINNING OF METALLIC UNDERGROUND UTILITIES USING IN-PIPE ACTIVE INFRARED THERMOGRAPHY

Underground utilities are often prone to damage due to aging and external factors in which external corrosion has been reported as the main reason for pipe failure. Thus, obtaining the thickness of the pipe wall of the existing pipeline is crucial to prevent pipe failure. The current non-destructive technologies applied for estimating wall thickness of metallic pipelines are limited and are often not applicable to small pipelines (< 400 mm diameter) that are used extensively on the onshore distribution network. This study assesses the thermal signature of wall thinning in ductile iron pipes, a common problem that is caused by external corrosion in hostile underground environment. A 1,5 m fresh ductile iron pipe section was prepared by milling 36 thinned regions of various lateral sizes (ranging from 25 mm to 75 mm), shapes, and residual thicknesses (ranging from 1,5 mm to 4,5 mm) onto the external wall. Wall thinning was investigated by active infrared thermography using hot air with temperature at 50 °C as a heat source with the aid of visual images. Infrared and visual images of the inner pipe wall during a 1-minute heating phase and a 3-minute colling phase were captured at a frequency of 9 Hz. Results indicated that thinned region are detectable by active thermography using hot air as thermal stimulus with a thermal contrast of at least 1 °C compared to sounded region. Therefore, a rapid condition assessment using infrared thermography for buried metal pipelines is successfully demonstrated.