

# **Circumferential guided wave system using MPT for corrosion monitoring of water supply pipelines**

**Seung Il Kim<sup>1</sup>, Minah Kim<sup>1</sup>, Hong Min Seung<sup>1</sup>**

<sup>1</sup>Intelligent wave engineering team, Korea Research Institute of Standards and Science, Republic of Korea

In this study, a circumferential guided wave system was applied to monitor the corrosion of water supply pipes. The system consists of the magnetostrictive patch transducers (MPT) and a pulser/receiver device. The MPT was designed to generate and measure the fundamental shear-horizontal mode (SH0) and is permanently installed on the exterior of the water supply pipes. The pulser/receiver device was developed to enable MPTs to operate efficiently at target frequencies. Furthermore, before conducting corrosion monitoring, a series of laboratory experiments were conducted to verify the feasibility of the system. We demonstrated that the circumferential shear-horizontal wave was not affected by the fluid inside the pipe and selected a specific chemical fluid for inducing corrosion defects on the inner surface of the pipes. After that, corrosion monitoring was performed by measuring changes in the circumferential shear-horizontal wave signal for 30 days in water supply pipe specimens installed in the field outside. The results showed that the amplitudes of SH wave signals linearly decrease with time as the corrosion widely spreads on the inside of the water supply pipe. Based on the results, one can see the system can be used for monitoring the corrosion status in water supply pipes. Further research will be conducted to implement the system on-site in water supply pipes.