

## EDP1-2

### Non-contacting ultrasonic guided wave testing for ferromagnetic pipes using HTS-SQUID gradiometer

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In this work, we investigated non-contacting ultrasonic guided wave testing technique based on magnetostriction method and HTS-SQUID. Magnetization method to transceive T(0, 1) mode guided waves on nickel thin pipe was studied by both electromagnetic field simulator and experiments utilizing magnetostriction method and HTS-SQUID gradiometer. In the both studies, a pair of electromagnets sandwiching a Ni pipe was used to magnetize the pipe, while rotating the pipe between the electromagnets. Both studies demonstrated that the magnetization method enabled us to magnetize the Ni pipe roughly uniformly in the whole circumference and also generate T(0, 1) mode guided waves on the pipe. All-round guided wave testing around the magnetized nickel pipe with artificial defect was also conducted using the HTS-SQUID gradiometer and compared with simulation result using ultrasonic wave simulator. The both results agreed well.

Keywords: HTS-SQUID, T(0, 1) mode ultrasonic guided wave, ferromagnetic pipe, magnetostriction