

## 빔형성방법을 이용한 흡음계수 측정법

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### Measurement of absorption coefficient using beamforming method

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**Key Words** : Beamforming method, MUSIC method, Spatial smoothing technique, Absorption coefficient.

**Abstract** : A method using beamforming has been developed to measure absorption coefficient of oblique incidence. MUSIC(Multiple Signal Classification) method detects the angle of incidence and reflection. And beamforming method separates the incident and reflected wave. And spatial smoothing technique is used to reduce the coherence between the incident and reflected wave. The test material were modeled as a locally reacting surface. Numerical and experiment results are performed to verify the performance of proposed method.

## 자왜 Tonpiliz 변환기의 음향특성 해석 프로그램 개발

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### Program Development for the Underwater-Acoustic Characteristic Analysis of Magnetostrictive Tonpiliz Transducer

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**Key Words** : FEM, Magnetostrictive materials, Tonpiliz Transducer, Terfenol-D

**Abstract** : Magnetostrictive materials are used low-frequency sonar transmitter instead of piezoelectric materials. But it is difficult to analyze due to the nonlinearity and hysteresis of magnetostrictive materials.

This paper deals with the program development based on finite element method to model the magnetostrictive tonpiliz transducers and to analyze their acoustic characteristics. To analyze the nonlinearity of magnetostrictive materials, the magnetic field calculation is separated from the displacement calculation, and curve fitting for the nonlinear behavior of the magnetic field and the mechanical strain is adopted. At first, the magnetic field is obtained by using commercial FEM software and the displacement of the transducer is calculated by plugging the obtained magnetic field as a forcing term. To verify the accuracy of the developed program, a comparison is made with a magnetostrictive exclusive analysis program, ATILA. Also, acoustic characteristics of magnetostrictive tonpiliz transducers is simulated in terms of radiation pattern and transmitted voltage response (TVR).