

# **Frequency characteristic analysis of omnidirectional SH0 wave transducer with segmented lead-free piezoceramics**

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Recently, a study has been conducted to develop an omnidirectional shear horizontal (SH) wave transducer by connecting segmented trapezoidal lead-free piezoelectric elements using a co-polling technique. It was confirmed that this transducer generates and measures SH waves omnidirectionally. However, a frequency characteristic analysis of this transducer has not been performed yet. Therefore, in this study, its frequency characteristics were analyzed both theoretically and experimentally. Firstly, the frequency response was calculated by considering the conditions of the given transducer based on the annular array transducer theory. These theoretical values were then compared with experimental results. In the experiment, the developed transducer was used as a transmitter to obtain the results. A unidirectional SH wave magnetostrictive patch transducer (MPT) was installed as a receiver at various positions. To obtain strictly the frequency response of the developed transducer, the transfer function was acquired with the experiment using a pair of MPTs as transmitters and receivers. This information was then reflected in the final results. Through this process, it was confirmed that the experimental results of frequency characteristics were well-matched with those theoretical values. Based on the results of this study, it is expected that designing the transducer having maximum outputs at target frequencies can be made.