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Experimental Characterization of A Piezoelectric Transducer Array Taking into Account Crosstalk Phenomenon

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Abstract

Ultrasonic transducer arrays are generally composed of several piezoelectric elements arranged in 1D or 2D ways. Crosstalk is an undesirable phenomenon decreasing the performance of these devices. It generates parasitic displacements at the elements' radiating surfaces, which changes the directivity of the array. Furthermore, the transducer's displacement plays a critical role in terms of the focal area and transferred intensities. The objective of this paper is to characterize a piezoelectric array composed of seven-elements made of PZ 27 ceramic experimentally. It investigates the effects of the crosstalk phenomenon on the array's performance in particular. The results have shown that the array's elements vibrate mainly in thickness mode, but the displacement is not uniform along their length due to the contribution of a parasitic length mode. Moreover, the major parasitic displacements are obtained on the neighboring passive elements: about -7.3 dB, -11 dB, and -12 dB, on the first, the second, and the third elements, respectively.

Keywords: ultrasonic transducer arrays, displacement measurement, directivity pattern, crosstalk

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