Estimating Acoustic Peak Pressure generated by ultrasound transducers from Harmonic Distortion Level Measurement

Matte GM, Borsboom JM, van Neer P, de Jong N.

Abstract
Pressure amplitude measurement is important for general research on ultrasound. Because it requires high accuracy, it is usually done using a hydrophone calibrated by an accredited laboratory. In this paper, a method is proposed for estimating the pressure amplitude in the ultrasound field using an uncalibrated single-element transducer and Khokhlov-Zabolotskaya-Kuznetsov simulations of the ultrasound field. The accuracy of the method is shown to be better than 20% for slightly focused and nonfocused transducers. Extending the method to a pulse-echo setup enables pressure measurement of a transducer without the need for an extra transducer or hydrophone.