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Using a polydisperse bubble cloud as a non-invasive pressure probe ANA MEDINA-PALOMO, JAVIER RODRIGUEZ-RODRIGUEZ, Carlos III Univ. of Madrid, Spain — Along the last 30 years, several techniques have been developed to measure non-invasively the pressure inside a liquid exploiting different features of the acoustic spectrum scattered by a cloud of bubbles. However, no technique is commercially avalilable nowadays, as all of them encounter technical difficulties that preclude their implementation. One of the common problems is that, in real (mostly medical) applications, bubble populations exhibit a wide range of sizes. We have studied numerically the acoustic behavior of polydisperse bubble clouds with the aim at evaluating the accuracy with which the pressure can be measured using one of these techniques. Namely, the determination of the pressure dependent component of the resonance frequency (Minnaert's frequency). A parametric study has been performed varying the properties of individual bubbles as well as those of the bubble distribution. The accuracy of the pressure measured using different conditions is reported, with suggestions for engineers and scientist working on the design of novel microbubbles (such as Ultrasound Contrast Agents). Finally, we have also developed a simplified expression to calculate the acoustic spectrum of a bubble population. This expression allows us to estimate, without the need of full simulations, the effect of the different parameters explored. Supported by the Spanish Ministry of Science through grant DPI2008-06369.

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