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Nonlinear characterization of a single-axis acoustic levitator

Review of Scientific Instruments **85**, 045125 (2014); <https://doi.org/10.1063/1.4872356>Marco A. B. Andrade¹, Tiago S. Ramos², Fábio T. A. Okina², and Julio C. Adamowski²[View Affiliations](#)[View Contributors](#) PDF

ABSTRACT

The nonlinear behavior of a 20.3 kHz single-axis acoustic levitator formed by a Langevin transducer with a concave radiating surface and a concave reflector is experimentally investigated. In this study, a laser Doppler vibrometer is applied to measure the nonlinear sound field in the air gap between the transducer and the reflector. Additionally, an electronic balance is used in the measurement of the acoustic radiation force on the reflector as a function of the distance between the transducer and the reflector. The experimental results show some effects that cannot be described by the linear acoustic theory, such as the jump phenomenon, harmonic generation, and the hysteresis effect. The influence of these nonlinear effects on the acoustic levitation of small particles is discussed.

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