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# Acoustic levitation of an object larger than the acoustic wavelength

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Marco A. B. Andrade<sup>1,a)</sup>, Fábio T. A. Okina<sup>2</sup>, Anne L. Bernassau<sup>3</sup>, and Julio C. Adamowski<sup>2</sup>

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## ABSTRACT

Levitation and manipulation of objects by sound waves have a wide range of applications in chemistry, biology, material sciences, and engineering. However, the current acoustic levitation techniques are mainly restricted to particles that are much smaller than the acoustic wavelength. In this work, it is shown that acoustic standing waves can be employed to stably levitate an object much larger than the acoustic wavelength in air. The levitation of a large slightly curved object weighting 2.3 g is demonstrated by using a device formed by two 25 kHz ultrasonic Langevin transducers connected to an aluminum plate. The sound wave emitted by the device provides a vertical acoustic radiation force to counteract gravity and a lateral restoring force that ensure horizontal stability to the levitated object. In order to understand the levitation stability, a numerical model based on the finite element method is used to determine the acoustic radiation force that acts on the object.

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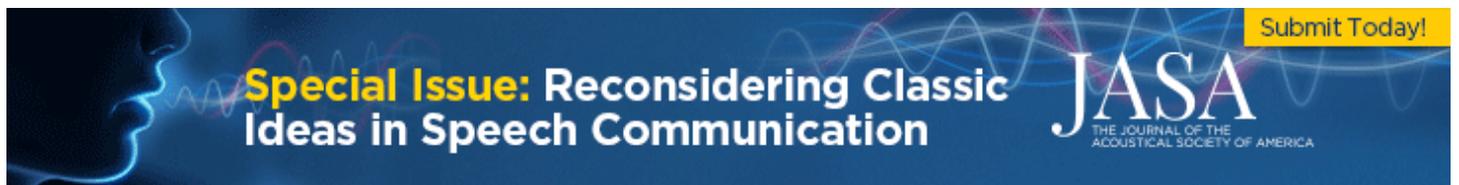
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