Abstract Submitted
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Negative radiation forces on spheres illuminated by acoustic Bessel beams.[1] PHILIP L. MARSTON, DAVID B. THIESSEN, Washington State University — An analytical solution for the scattering of an acoustic Bessel beam by a sphere centered on the beam has made it possible to explore the way the acoustic radiation force on elastic and fluid spheres depends on beam and material parameters. Situations have been previously noted where, even in the absence of absorption, the radiation force of the beam on the sphere is opposite the direction of beam propagation [1]. In extensions of that work, conditions have been identified for such a force reversal on solid spheres and elastic shells. Negative radiation forces may be useful for manipulation of objects in reduced gravity and of biological cells (with single beam acoustic tweezers). The finite element method (FEM) has been used to evaluate the total acoustic field in the region near the sphere. This makes it possible to evaluate the radiation force from numerical integration of an appropriate projection of the Brillouin radiation stress tensor. FEM and analytical results agree for plane wave and Bessel beam illumination. 1. P. L. Marston, J. Acoust. Soc. Am. 120, 3518-3524 (2006).

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