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Acoustical radiation torque and force for spheres and Bessel beam extinction efficiency PHILIP L. MARSTON, Washington State University, Pullman, LIKUN ZHANG, University of Texas, Austin — The scattering of optical and acoustical beams is relevant to the levitation and manipulation of drops. Here we examine theoretical developments in the acoustical case. We previously showed how the optical theorem for extinction can be extended to invariant beams. The example of a sphere in a Bessel beam facilitates the direct comparison with a circular disc computed using Babinet's principle and the Kirchhoff approximation (P. L. Marston, J. Acoust. Soc. Am. 135, 1668-71 (2014)). In related work, by considering traveling or standing wave first-order vortex beams we previously showed that the radiation torque is the ratio of the absorbed power and the radian acoustic frequency (L. Zhang and P. L. Marston, Phys. Rev. E. 84, 065601 (2011)). By modifying the scattering to account for the viscosity of the surrounding fluid in the analysis of the absorbed power, approximations for radiation torque and force are obtained at long wavelengths in special cases (P. L. Marston, Proc. Meetings on Acoustics 19, 045005 (2013)) and these can be compared with results published elsewhere.

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