

74th Annual Meeting of the APS Division of Fluid Dynamics

Volume 66, Number 17

Sunday–Tuesday, November 21–23, 2021; Phoenix Convention Center, Phoenix, Arizona

Session T31: Acoustics: General & Hydroacoustics

12:40 PM–3:16 PM, Tuesday, November 23, 2021

Room: North 232 ABC

Chair: Mark Miller, Penn State University

Abstract: T31.00006 : Acoustic radiation forces and torques on compressible micro rings in standing waves

1:45 PM–1:58 PM

← Abstract →

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Acoustic radiation forces and torques on spherical particles and spheroids have been studied extensively. Here, we present a numerical study to calculate acoustic radiation forces and torques on micro rings in an ultrasonic standing wave in an inviscid fluid based on the perturbation method. The acoustic radiation force is due to the background pressure field and scattered waves from ring segments. Effects of various parameters: geometry, orientation, and position as well as density and compressibility ratios of the ring material and the fluid on acoustic radiation forces and torques are investigated. The results show that the acoustic radiation forces and torques depend on the position of the rings with respect to the pressure node of the standing waves but also depend on the particle's material and its surrounding medium. Rings that are not co-planar with the standing waves are subject to non-zero torque. Lastly, numerical results are compared with the chain of spheres (CoS) model, which is based on a segmentation of the ring and treating each segment as a spherical particle. Our study sheds light on acoustic radiation forces and torques that will improve the acoustic control of ring-shaped microparticles.