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Experimental validation of the directional sensitivity of the acoustic radiation force to particle diameter WEIYU RAN, J.R. SAYLOR, Clemson University — A review of existing theories for the acoustic radiation force on a particle reveals a contradiction. Some theories predict that this force exhibits a change in sign at a critical particle diameter (all other parameters held constant), while other theories predict no such sign change. To ascertain which result is correct, experiments were conducted using an ultrasonic standing wave field in air. Particles were injected into this field whereupon, as expected, they migrated toward the pressure nodes of the standing wave field. The average diameter of these particles was gradually decreased. Under such conditions, the particles should either (i) continue to migrate to the pressure nodes, or (ii) migrate to the pressure anti-nodes at a critical diameter, if a change in sign of the acoustic radiation force exists. The results of these experiments will be presented, along with their implications on extant theories.

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