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Boundary effects on streaming flow around a bubble located at the velocity antinode of a standing wave MOHAMMAD ALHAMLI, College of technological studies — A stable bubble trapped in a standing sound wave with frequency less than the resonance frequency of the bubble will be located at the velocity antinode. Steady streaming flow will develop around the bubble and is directly dependent on the bubbles boundary. Four boundary conditions are possible: 1) nonpulsating; no slip, 2) nonpulsating; free shear, 3) pulsating; no slip, and 4) pulsating; free shear. To solve for these conditions, we expanded the equations of motion with the dimensionless lateral oscillation amplitude,ϵ, using the singular perturbation method. The lateral oscillation amplitude is much smaller than the bubble radius $\epsilon << a$. Additionally, for the third and fourth cases, the dimensionless radial oscillation amplitude was assumed to be small,$\epsilon' << 1$. We also assumed a moderate value for the frequency parameter,$|M|$, which is the ratio of the bubble radius to the viscous length. For the nonpulsating cases the streaming flow patterns were quadrupole and symmetric across the quadrants and the intensity increases as we increase the frequency parameter. When we introduced the pulsation, we noticed that the streaming was symmetric across the polar plane and asymmetric below the equatorial plane for midrange values of the frequency parameter.

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