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**Acoustic Radiation Force on a Finite-Sized Particle due to an Acoustic Field in a Viscous Compressible Fluid** SUBRAMANIAN ANNAMALAI, MANOJ PARMAR, BALACHANDAR S., Department of Mechanical and Aerospace Engineering, University of Florida, Gainesville, Florida, USA — Particles when subjected to acoustic waves experience a time-averaged second-order force known as the acoustic radiation force, which is of prime importance in the fields of microfluidics and acoustic levitation. Here, the acoustic radiation force on a rigid spherical particle in a viscous compressible medium due to progressive and standing waves is considered. The relevant length scales include: particle radius ($a$), acoustic wavelength ($\lambda$) and viscous penetration depth ($\delta$). While $a/\lambda$ and $a/\delta$ are arbitrary, $\delta \ll \lambda$. A farfield derivation approach has been used in determining the radiated force. Expressing the flow-field as a sum of the incident and scattered fields, an analytical expression for the force is obtained as a summation over infinite series (monopole, dipole and higher sources). These results indicate that the contributions from monopole, dipole and their cross-interaction are sufficient to describe the acoustic radiation force. Subsequently, the monopole and dipole strengths are represented in terms of the particle surface and volume averages of the incoming velocity. This generalization allows one to evaluate the radiation force for an incoming wave of any functional form. However acoustic streaming effects are neglected.

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