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Compressibility and Related Thermal and Diffusional Effects in Acoustics Streaming SATWINDAR SADHAL, University of Southern California, ALEXEY REDNIKOV, Université Libre de Bruxelles — The effects of air compressibility have been analyzed for acoustic streaming due to acoustic fields interacting with solid boundaries. These include possible influence of the thermal boundary layer and, if the surrounding gas is a multicomponent mixture, of the diffusional boundary layer. It is well known that acoustic streaming originates in the viscous boundary layer at the surface of a particle, where flow is genuinely rotational and thus, a steady flow component is generated as soon as nonlinearities take effect. While this crucial role of the viscous boundary layer has been widely recognized, little attention has been paid to the role of the thermal boundary. The latter one, besides being of interest to purely thermoacoustics, may also affect the streaming itself. Since density is a function of temperature (as well as gas composition), a sharp temperature variation in the boundary layer gives rise to the corresponding density variation, influencing the flow field (continuity equation), and globally affecting streaming intensity.

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