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**Strong wave/mean-flow coupling in baroclinic acoustic streaming** GREG CHINI, University of New Hampshire, GUILLAUME MICHEL, Ecole Normale Superieure — Recently, Chini *et al.* [*J. Fluid Mech.*, Vol. 744 (2014)] demonstrated the potential for large-amplitude acoustic streaming in compressible channel flows subjected to strong background cross-channel density variations. In contrast with classic Rayleigh streaming, standing acoustic waves of $O(\epsilon)$ amplitude acquire vorticity owing to baroclinic torques acting throughout the domain rather than via viscous torques acting in Stokes boundary layers. More significantly, these baroclinically-driven streaming flows have a magnitude that also is $O(\epsilon)$, i.e. comparable to that of the sound waves. In the present study, the consequent potential for fully two-way coupling between the waves and streaming flows is investigated using a novel WKBJ analysis. The analysis confirms that the wave-driven streaming flows are sufficiently strong to modify the background density gradient, thereby modifying the leading-order acoustic wave structure. Simulations of the wave/mean-flow system enabled by the WKBJ analysis are performed to illustrate the nature of the two-way coupling, which contrasts sharply with classic Rayleigh streaming, for which the waves can first be determined and the streaming flows subsequently computed.

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