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Linear and nonlinear propagation of single-frequency dissipative waves in ducts with slowly-varying cross section[1] PABLO L. RENDON, ICAT, Universidad Nacional Autonoma de Mexico, NIGEL PEAKE, DAMTP, University of Cambridge — Finite-amplitude sound waves propagating in ducts are subjected to a variety of competing effects. In the context of the acoustics of wind instruments, nonlinear steepening is known to occur in trombones and trumpets when these instruments are played loudly, and in aircraft engine intakes buzz-saw noise is also associated with nonlinear propagation. The main dissipative mechanisms in these ducts tend to be losses at the duct walls rather than viscothermal attenuation. These losses are due to a Stokes boundary layer which oscillates as the waves pass. In both these contexts, the duct cross-section varies slowly, and this typically means that the wavenumber will change along the length of the duct. We use a WKBJ method to obtain equations which describe acoustic wave propagation subject to combinations of these effects, and for ducts of different geometries.

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