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Multiple Scale Analysis of waves inside three dimensional acoustic flow waveguide with axial temperature gradients and sinusoidal walls

The wave propagation in a three dimensional hard walled acoustic waveguide having no uniform cross section and carrying mean flow and walls having weak sinusoidal undulations is investigated by using method of multiple scales. The uniform first order asymptotic expansions near resonant frequencies are considered. The mean flow is assumed to be uniform. The solvability conditions for resonant frequencies are determined. It has been found that both decaying as well as growing wave solutions are possible depending on initial conditions.