Nonlinear phenomena of small-scale sound in a gas with exponential stratification

Anna Perelomova, author

Abstrak

ABSTRAK
The nonlinear dynamics of perturbations, quickly varying in space, with comparatively large characteristic wavenumbers k k > 1/H, is considered. H is the scale of density and pressure reduction in unperturbed gas, as the coordinate increases H is the so called height of the uniform equilibrium gas. Coupling nonlinear equations which govern the sound and the entropy mode in a weakly nonlinear flow are derived. They describe the dynamics of the gas in the leading order, with an accuracy up to the terms k H min 1. In the field of the dominative sound mode, other induced modes contain parts which propagate approximately with their own linear speeds and the speed of the dominative mode. The scheme of successive approximations of nonlinear links between perturbations in the progressive mode is established. The numerical calculations for some kinds of impulses confirm the theory.