HYDRODYNAMIC EXCITATION SPECTRUM AND TIME CORRELATION FUNCTIONS FOR A MIXTURE OF MAGNETIC AND NONMAGNETIC PARTICLES

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S u m m a r y

We investigate the hydrodynamic excitation spectrum and hydrodynamic time correlation functions for a mixture of magnetic and nonmagnetic particles. It is shown that, from the mathematical point of view, this problem is equivalent to the spectral problem of a hydrodynamic matrix of evolution. The structure of a hydrodynamic matrix, which follows from the symmetry properties of the system, is analyzed. On this basis, the generalization which allows one to consider the hydrodynamics of a multicomponent mixture is proposed. By means of matrix perturbation theory, it is shown that there exist two sound and m dissipative modes among the collective modes, where m is determined by the number of additive integrals of motion. The analytic expressions for the weight coefficients, which describe partial contributions of each mode to time correlation functions, constructed on the base of the density operators of conserved quantities, are derived. On this base, the expressions for dynamical structure factors are found in the case of a binary mixture of magnetic and nonmagnetic particles in the paramagnetic state.