Self-consistent relaxation theory of the collective dynamics of a non-ideal plasma. Generalized hydrodynamics regime

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In this paper, we develop a theoretical formalism describing the collective dynamics of particles in a strongly nonideal one-component plasma with Yukawa and Coulomb interactions. Taking into account the peculiarities inherent in these systems, the regime of generalized hydrodynamics is considered in detail. Analytical expressions are obtained that allow, knowing the basic parameters of the system and the corresponding information on the structure, to calculate the spectra of the dynamic structurefactor, dispersion laws, sound speed and sound attenuation without using any fitting parameters. Authors acknowledges the Foundation for the Development of Theoretical Physics and Mathematics BASIS (project No. 20-1-2-38-1).