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Linear plasma response, electrostatic fluctuations and Thomson scattering WOJCIECH ROZMUS, ZHEN ZHENG, University of Alberta, VALERY YU. BYCHENKOV, ANDREI V. BRANTOV, P.N. Lebedev Physics Institute, RAS — Our nonlocal and nonstationary transport theory provides a method of solution of the initial value problem for the full set of linearized Fokker-Planck kinetic equations with Landau collision operators. The closure relations reduce the problem of finding particle distribution functions to the solution of the close set of fluid equations. This has been recently realized for the electron-ion plasma in the entire range of plasma collisionality. No particular choice of the initial distribution function is necessary to derive the longitudinal plasma susceptibility from the full set of kinetic equations. We will discuss new complete results for in electron-ion plasmas. The full description of the longitudinal plasma response is used in the derivation of damping and dispersion relations for electrostatic fluctuations such as Langmuir waves, ion-acoustic and entropy modes. Particle collision effects are rigorously accounted for. The Onsager's regression of fluctuations method is applied to derive dynamical form factor S(k,w) and Thomson scattering (TS) cross-section from the set of fluid equations. We will discuss application of the nonlocal hydrodynamics to the derivation of S(k,w). In particular, we will examine the importance of an entropy mode peak as the direct measure of ion temperature in TS experiments.

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