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Kinetic dispersion relation for electrostatic electron waves in a low-pressure collisional plasma J. OBERRATH, R.P. BRINKMANN, Ruhr-University Bochum, Germany — For the kinetic description of plasma waves a number of approaches are common: 1) the Vlasov equation is discussed, if collisions between particles can be neglected, 2) the BGK collision term is used in a weakly ionized plasma to take collisions into account, and 3) the Fokker-Planck approach is applied to describe waves in Coulomb collision dominated plasmas. We investigate electrostatic electron waves in a weakly ionized low-pressure plasma dominated by electron-neutral collisions. We assume an isotropic collision term with a constant collision frequency instead of the BGK term because of the huge mass difference between electrons and neutrals. This allows the derivation of the dispersion relation from the linearized Boltzmann-Poisson system for homogeneous longitudinal waves. In contrast to established dispersion relations our relation is able to describe the influence of collisions on the electrostatic wave propagation of electrons. The dispersion relation including the dispersion function for a Maxwell distribution is a special case of our result. A similar description is given in [1], where the distribution function is expand to spherical harmonics in velocity space and terms of higher orders are neglected. We do not resort to such an expansion but treat the electron distribution function in full. [1] S.B. Biragov et al, Radiophys. Quantum Electron. 28 (1985) 743-748

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