

THE SCREENING CHARACTERISTICS OF THE ASTROPHYSICAL PLASMAS: THREE-COMPONENT SYSTEMS

Lj. M. Ignjatović and V. A. Srečković

Institute of Physics, Pregrevica 118, 11080 Zemun, Belgrade, Serbia

E-mail: vlada@ipb.ac.rs, ljuba@ipb.ac.rs

Here, as the object of investigation, astrophysical fully ionized electron-ion plasma is chosen with positively charged ions of two different kinds, including the plasmas of higher non-ideality. The direct aim of this work is to develop, within the problem of the finding of the mean potential energy of the charged particle for such plasma, a new model self-consistent method of describing of the electrostatic screening. Within the presented method such extremely significant phenomena as the electron-ion and ion-ion correlations are included in the used model, and all types of the necessary conditions are clearly defined. The characteristics of the considered plasmas in a wide region of the electron densities and temperatures are calculated. The case of the three-component systems was considered which is especially important since further increase of the number of the ion components did not cause appearance of any new phenomena. We wish to draw attention that developed method is suitable for astrophysical applications. Here we keep in mind that in outer shells of stars the physical conditions change from those which correspond to the rare, practically ideal plasma, to those which correspond to extremely dense non-ideal one. However, the method presented gives a possibility to describe the electrostatic screening of all such outer shells in the same way, by means of the obtained screening characteristics.