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DIELECTRIC FUNCTION OF DENSE PLASMAS AND SUM RULES*

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The fulfilment of sum rules for the loss function which is determined using different models of the dielectric function (DF): the random phase approximation (RPA), Mermin, and extended models of RPA and Mermin is investigated1. In the extended models the dynamic collision frequency is used, which is calculated according to computer simulations and within the Born-Mermin model. It is shown that the DF obtained by the method of moments satisfy all sum rules. For other models of DF these equalities hold in part. Mermin and RPA models do not satisfy known, associated with convergent frequency zero and fourth moment, sum rules, but satisfy the second sum rule. These models take into account the electron-electron interaction only with the introduction of electron correction on a local-field, but do not take into account the electron-ion interaction.

1. Yu.V. Arkhipov, A.B. Ashikbayeva, A. Askaruly, A.E. Davletov and I.M. Tkachenko, “Dielectric function of coupled plasmas, the stopping power, and the sum rules”, Physical Review E, 2014, Vol. 90, p. 053102.

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