Onsager's bookkeeping rule and basic chemical models of non-ideal atomic plasma

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The high-temperature behaviour of an equation of state of hydrogen plasma is considered in physical and chemical models. The exact asymptotic relationship is obtained that connect a pressure correction in chemical models and a high-temperature limit of an ionization equilibrium constant. Execution of the received relationship ensures analytical implementation of Onsager's bookkeeping rule [1] and correct (that agree with a physical model results) asymptotic of an equation of state of any chemical model at high temperatures. The comparative analysis of calculations is made along a hydrogenous component of a solar path of an equation of state, a sound velocity and an isentropic index of compressibility using various chemical models and a physical model. It is shown, that a reason of the worst comparison with calculations within the physical model [2], calculation within the well known astrophysical chemical model of Mihalas, Hammer and Dappen [3] is violation of Onsager's bookkeeping rule that is bound with using of Debye approach for a corrections to thermodynamic functions simultaneously with using nearest neighbor approximation for the partition function of atom. The Debye approximation modification offered in [4], i.e. transferring to basic chemical models, allows to achieve exactitude of a physical model using the nearest neighbor approximation for the partition function of atom and execution of Onsager's bookkeeping rule.

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