THE ELECTRONIC TRANSPORT COEFFICIENTS AND PRESSURE OF Ni PLASMA

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The thermophysical properties of various substances have been studied for more than a century because of their importance in fundamental tasks and applications. Among these properties there are the pressure, the electrical and thermal conductivities etc. However at high temperatures ($T > 5$ kK) there is the deficiency of corresponding information as far as it is difficult to carry out the measurements in these region. Nevertheless, recently the new experiments for these properties have appeared in the plasma region [1-4]. So the existing theoretical models can be checked.

In our previous works [5-7], we have developed the model to calculate the chemical composition, electronic transport coefficient, pressure, internal energy for the plasma under study. Here we have applied the chemical model, developed earlier for various substances, to obtain the plasma composition of Nickel. So we modified it correspondingly. The pressure and internal energy can also be obtained by means of this technique. The coefficients were calculated within the relaxation time approach (also the BGK approximation [8]). The range of applicability of both approaches is limited when the density increases (see corresponding estimates in [6, 7]). But the measurement data [1-4] are located in the area where the application of our approach is still correct. Previously our model has been successfully applied for plasmas of noble gases, noble metals, silicon and boron [5-7]. Here we use it to study Nickel. The measurements of the properties under study are presented in [1, 2] at $T \geq 10$ kK and densities less than normal one. Our calculations have also been carried out under these conditions. The obtained results are in good agreement with the results of measurements and calculations of other authors.