the CALCULATION OF ELECTRONIC TRANSPORT COEFFICIEN and pressure in TItanium AND zinc PLASMA

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The thermophysical properties of various substances have been investigated for more than hundred years in experiments as well as in theories. The plasma region is especially difficult for the measurements because it is located at high temperatures (T > 5kK), which can be inaccessible for nowadays experimental techniques. But, during last two dozen years new measurements have appeared in plasma region [1-4]. The electrical conductivity, pressure, internal energy were measured in these experiments, which as a rule are based on the wire or foil explosion processes. So the temperatures can be measured directly. Nevertheless the existinf theoretical models can be used to check these measurement data

Earlier we have developed the model of calculation of the chemical (ionic) composition for partially ionized plasma. This model is based on the action mass law and it allows one to calculate the thermodynamic functions as well (the pressure, the internal energy etc.). Besides, we have developed the model of calculations for the electronic transport coefficients (the electrical conductivity, the thermal conductivity and the thermal power). For the condition of partially ionized plasma the time relaxation approximation is correct. So our model for coefficients is based on this approximation. Both these models have been successfully applied for plasmas of noble gases, noble metals, silicon and boron [5-8]. (For these elements there are realistic transport cross-sections electron–atom). Presently we use our approach to calculate the pressure and the above transport coefficients for two more metals, namely titanium and zinc. The measurements of the properties under study for titanium are presented in [1, 2], while for zinc – in [4], at Т≥10 kK and densities less than normal one. These conditions correspond to the area of low – temperature plasma of metals. 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.

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