

# Calculation of the equation of state, composition and transport properties of dense lead plasma

**Shumikhin A S**

Joint Institute for High Temperatures of the Russian Academy of Sciences,  
Izhorskaya 13 Bldg 2, Moscow 125412, Russia

shum\_ac@mail.ru

The paper presents the calculations of the equation of state, composition and conductivity of a dense plasma of lead vapor at temperatures 10000–60000 K and at a density below the critical one. The ion-molecular chemical model of non-ideal gas-plasma mixture was used for calculation, that previously proposed for the aluminum vapors plasma [1] and other metals [2]. The model takes into account the Coulomb interaction of charges in the Debye approximation in the Grand canonical ensemble (Grand Debye–BD). The charge-neutral and neutral-neutral interactions has also been taken into account. Satisfactory agreement has been obtained with the latest experimental data [3] for the equation of state and conductivity (resistance) of lead vapors in the region of applicability of the model. It is shown, that the jellium model [4] is necessary to use when calculating conductivity at densities higher than the critical one.

[1] Khomkin A L and Shumikhin A S 2012 *High Temp.* **50** 307–314

[2] Khomkin A L and Shumikhin A S 2014 *High Temp.* **52** 328–336

[3] Kondratyev A M, Korobenko V N and Rakhel A D 2018 *J. Exp. Theor. Phys.* **127** 1174–1086

[4] Khomkin A L and Shumikhin A S 2021 *Phys.-Usp.* **64** 1125–1148