

On the interrelation between the metal–non-metal and liquid–gas transition in metallic fluids

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Based on the recently obtained experimental data [1,2], the interrelation between the metal–non-metal transition occurring in the fluid state as a result of the density changes, and the liquid–gas transition is investigated for pure lead and the lead–bismuth eutectic alloy. To construct the equations of state for these substances, a phenomenological approach is used, which allows the equation of state to be derived, the accuracy of which is determined mainly by the accuracy of the experimental data. No additional assumptions about the structure of the equation of state are used in this approach [3]. Analysis of the behavior of thermodynamic functions and the electrical resistivity of the fluids in the metal–non-metal transition region has shown that there is a certain density at which the metal–non-metal transition occurs and for both fluids this density coincides with the critical density of the liquid–gas transition. However, other critical parameters of the fluids (such as critical pressure, the resistivity value at the critical point etc) differ significantly from each other.

- [1] Kondratyev A M, Korobenko V N and Rakhel A D 2018 *J. Exp. Theor. Phys.* **127** 1074–1086
- [2] Kondratyev A M, Korobenko V N and Rakhel A D 2022 *J. Phys.: Condens. Matter*
- [3] Rakhel A D 2018 *J. Phys.: Condens. Matter* **30** 295602