ANALYSIS OF METHODS FOR CONSTRUCTING A PHASE EQUILIBRIUM LINE FOR DIFFERENT MODELS OF MEAN DIAMETER

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We analyzed various models of the phase equilibrium line in the range from the triple point to the critical point. For this we used a system of mutually consistent equations. This system includes: the equation of the elasticity line $p = p_s(T)$ in the form used in [1], the equation for the saturated liquid density, the singular component of which has the following form:

$$\rho^+(T) = \rho_c \left(1 + \sum_{n=1} D_n^* |\tau|^{n\beta} + D_2 |\tau|^{\beta+\Delta} + D_2 |\tau|^{1-\alpha} + \dots\right); \qquad (1)$$

the equation for the saturated vapor density ρ^-:

$$\rho^-(T) = T p'_s(T) \left(1 - \rho^-/\rho^+\right) [r(T)]^{-1} = T p'_s(T) [r^*(T)]^{-1}, \qquad (2)$$

where $r^* = r/(1 - \rho^-/\rho^+)$ is the "apparent" heat of vaporization; the singular component of which has the following form:

$$r^*(T) = \left(\frac{p_c}{\rho_c}\right) \left(d_0 + \sum_{n=1} d_n^* |\tau|^{n\beta} + d_2 |\tau|^{\beta+\Delta} + d_3 |\tau|^{1-\alpha} + \dots\right). \qquad (3)$$

Here p_c is the critical pressure; $\tau = t - 1$; $t = T/T_c$; T_c is the critical temperature; α, β, Δ are critical indices; ρ_c is the critical density; r is the heat of vaporization.

On the basis of this system of equations $p = p_s(T)$ [1] and (1)–(3), an analysis of a number of mean diameter models has been performed. In doing so we used the same array of data on the pressure of p_s and the density ρ^+ and ρ^- a number of substances (argon, sulfur hexafluoride, DEE, etc). The results obtained for different models of mean diameter are discussed.

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1. Kozlov A.D., Lysenkov V.F., Popov P.V., Rykov V.A. // J. Eng. Phys. Thermophys. 1992. V. 62. P. 611.