Some thermodynamic complexes connected with the gas and liquid densities on the saturation line of SF_6

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In this paper we consider a number of objects. Among them, the first are the liquid (ρ_l) and gas (ρ_g) densities on the saturation line of SF_6. Secondly, we select group I of models those are related to properties (ρ_l, ρ_g) and include such equations as

$$f_s(D, C, \tau) = B_{s0}\tau^{\beta} + B_{s1}\tau^{\beta+\Delta} + \dots, \quad (1)$$

$$f_d(D, C, \tau) = B_{d0}\tau^{2\beta} + B_{d1}\tau^{1-\alpha} + \dots, \quad (2)$$

where f_d is the average diameter of the bimodal, f_s is the order parameter, $D = (T_c, \rho_c, \beta, \alpha, B_{d0}, B_{s0})$ are the critical characteristics of a substance, $C = (B_{s1}, B_{d1}, B_{d2}, \dots)$ are the coefficients determined by a statistical processing of experimental (ρ_l, ρ_g, T)-data within $\tau = 2 \times 10^{-4} \dots 0.3$, $\tau = (T_c - T)/T_c$ is the relative temperature. Group I includes an equation representing the relative height, $y = 2h/d$, in the form

$$y = \pi/4(-ur + 0.002/f_s)(1 + x), \quad (3)$$

where h is the height of a meniscus, d is the diameter of the cell, $ur = f_d/f_s$ is the thermodynamic complex. Model (3) is proposed in the work of Prof. Garrabos (2018) in order to describe his own (h, τ) data obtained in some experiment. This cell has a form of the horizontal cylinder ($d = 10.606$ mm), which contains the SF_6 sample at temperatures when two phases are separated by a meniscus. An optical system allows measuring the height, h, on which the meniscus is placed. Within the framework of our task, it is tested model (3). At the stage, we select model (3) and determine the calculated (h, τ) data using models (1) and (2) at temperatures $\tau = 10^{-6} \dots 10^{-3}$.