

New Technical Equation of State for Simple Fluids

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This work is devoted to the development of a new short equation of state for calculation of the thermal properties of simple fluids suited for advanced technical applications. Previously we obtained the equations of state for polar and nonpolar gases [1,2], which describe the thermodynamic properties of substances with reasonable accuracy at temperature up to 500...1000K, pressures up to 50...100MPa, and densities up to 1.5 times the critical density. It takes into account that the compressibility factor would have as one of the summands a function of density only [3], and the isochoric heat capacity has a positive value [4]. The equation of state is formed by the sum of the product of temperature and density functions. As a temperature function, we used an equation for the second virial coefficient [5] and the density function was found from experimental data. Accurate data were used to develop the functional form of the new equation of state. The new equation of state has six adjustable constants and can be applied to substances with limited data.

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