UNIVERSAL EQUATION OF STATE OF NON-IDEAL GAS FOR THE CRITICAL AND SUPERCRITICAL REGIONS

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A universal equation of state (EOS) for a nonideal gas in the near-critical and supercritical regions is constructed. It was used for real substance (methane) and three model systems. To obtain this EOS, the virial series was modified by means of the pressure expansion in a series of powers of density along a straight line for a unit compressibility factor lying in the supercritical region. The high-order coefficients of this modified expansion can be expressed through the second one. It allows us to obtain a universal EOS, which includes the values, determined by the form of potential (second virial coefficient, Boyle and critical parameters). The EOS does not contain any empirical constants. The critical parameters obtained by means of the EOS for three model systems and substance (methane) are in good agreement with the data of numerical simulations and experiment.