

Equation of state for vapor-liquid equilibria of chain fluids near to and far from the critical region

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Classical fluid theories adopt mean field approximation which does not describe the long range fluctuations in the near critical region and it causes inaccurate prediction of critical properties. The renormalization group theory incorporates this effect using phase space cell approximation and enhances the accuracy in the vicinity of critical point.

In this work, we applied the renormalization group theory to simplified version of the perturbed hard sphere chain equation of state to calculate vapor-liquid equilibria and minimize deviation with respect to the experimental data in entire fluid region. Renormalization procedure is based on the studies of Lue and Prausnitz and the additional adjustable parameter introduced by Bymaster et al. is added.