A New Triangular-Well-Based SAFT Equation of State

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A new Statistical Associated Fluid Theory equation of state was developed based upon the Triangular-Well (TW) fluid potential proposed by Betancourt-Cárdenas et al. [Mol. Phys. 105 (2007) 2987 and Mol. Phys. 106 (2008) 113] and based on the perturbation theory by Barker-Henderson. The development is similar to that of the original Chapman et al. [Industrial & Engineering Chemistry Research, 1990] approach, but incorporates the dispersion term from the Betancourt-Cárdenas equation of state. The TW potential is more realistic than the well-known square-well (SW) potential commonly used in the popular SAFT and PC-SAFT equations. Additionally, the TW keeps a significant analytical simplicity compared to other potentials. The TW shows itself to be a great potential to be used for molecular based equations of state, as can be observed in the following works: Zhou [J. Chem. Phys. 130 (2009), 014502], Koyuncu [Mol. Phys. 109 (2011), 565], and Rivera et al. [Mol. Phys. 110 (2012), 1317]. The results obtained in the prediction of compressed liquid densities at pressure of saturation are promising for non-associated and associated substances.