Test of Ising-Like Equation-of-State Models Using Turbidity Measurements in Near Critical Fluids

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Two different critical-to-classical crossover formulations of the universal equation-of-state of Ising-like systems are tested analyzing light transmission and turbidity measurements performed in near critical fluids (SF6 and xenon). In SF6 case, turbidity measurements in the (one-phase) homogeneous region close to its critical point have benefited from the off-density criticality of the test cells and from the microgravity environment of the space stations. These precise measurements performed in the high-quality thermal and optical environment of dedicated facilities (ALICE 2/MIR and DECLIC/ISS) allow asymptotic formulations for the static isothermal compressibility and the correlation length to be verified. In xenon case, the turbidity measurements of Güttinger and Cannell (PRA **24**, 3188, 1981) have been reanalyzed by checking their consistency with other thermodynamic properties measurements (pρT, liquid-gas coexisting densities, sound velocity, etc). The differences between the theoretical formulations of the Ising-like equation-of- state models are analyzed to evaluate their influence in the determination of the fluid-dependent parameters when experimental data are covering a region of the near-critical phase surface unattainable from ground-based experiments