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Scaling fields and equation of state near the liquid-liquid critical point in supercooled water DAPHNE FUENTEVILLA, MIKHAIL ANISIMOV, University of Maryland, College Park — We have developed a scaled parametric equation of state to describe and predict thermodynamic properties of water in supercooled conditions. The equation of state is built on the assumption that in the supercooled water an additional critical point, the critical point of liquid-liquid separation, does exist. Although this second critical point of water is not accessible experimentally, the pre-critical anomalies affect thermodynamic and transport properties of water in the metastable and even in stable regions and can be observed experimentally. Our approach is based on the principle of critical-point universality. The equation of state is universal in terms of theoretical scaling fields and belongs to the three-dimensional Ising-model class of universality. The theoretical scaling fields are postulated to be analytical combinations of physical fields (pressure and temperature). The proposed equation of state enables us to accurately locate the "Widom line" (the locus of stability minima) and the position of the critical point, as well as to predict the thermodynamic properties in the regions that are not accessible to experiments.

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