Title:	(2021).Continuous demixing transition of binary liquids: Finite-size scaling from the analysis of sub-systems.
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Abstract:	A binary liquid near its consolute point exhibits critical fluctuations of localcomposition and a diverging correlation length. The method of choice tocalculate critical points in the phase diagram is a finite-size scaling analysis,based on a sequence of simulations with widely different system sizes.Modern, massively parallel hardware facilitates that instead cubicsub-systems of one large simulation are used. Here, this alternative is appliedto a symmetric binary liquid at critical composition and different routes to thecritical temperature are compared: 1) fitting critical divergences of thecomposition structure factor, 2) scaling of fluctuations in sub-volumes, and 3)applying the cumulant intersection criterion to sub-systems. For the lastroute, two difficulties arise: sub-volumes are open systems, for which noprecise estimate of the critical Binder cumulantUcis available. Second, theboundaries of the simulation box interfere with the sub-volumes, which isresolved here by a two-parameter finite-size scaling. The implied modificationto the data analysis restores the common intersection point, yieldingUc=0.201±0.001, universal for cubic Ising-like systems with freeboundaries. Confluent corrections to scaling, which arise for small sub-systemsizes, are quantified and the data are compatible with the universal correctionexponent$\omega \approx 0.83$.
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