Abstract Submitted
for the APR07 Meeting of
The American Physical Society

Computational techniques for quantitative characterization of critical fluctuations in binary fluids ANA OPRISAN, SORINEL OPRISAN, College of Charleston, JOHN HEGSETH, University of New Orleans — The observation and analysis of fluctuations near the critical point in real time and space is an important issue in the critical point phenomena. This important aspect is related to statistical physics and to microscopic image formation. Using three different techniques, bright field (BF), phase contrast (PC), and dark field (DF), we investigated a liquid mixture system of methanol and partially deuterated cylcohexane. The recorded images corresponding to BF, PC, and DF exhibit intensity variation in the spatial domain. Image analysis finds similarities in the image formation for BF and PC, but differences for DF. Using different image analysis techniques, we found that the gray level probability distribution functions are Gaussian for both bright field and phase contrast, and that the distribution is different not only in amplitude but also in the tail of the distribution for the dark field. The power spectra corresponding to images recorded with these techniques show the existence of large fluctuations in these images and their connection to generalized nucleation. Fluctuations recorded in these images are evidence of self-similarity in real space.

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Date submitted: 04 Feb 2007 Electronic form version 1.4