Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

The Resolution of the Domain Chaos Puzzle for Rotated Rayleigh-Bénard Convection[1] NATHAN BECKER, GUENTER AHLERS, UC Santa Barbara — Due to the Küppers-Lortz instability, Rayleigh-Bénard convection-patterns exhibit spatio-temporal chaos at the onset of convection when the sample rotates fast enough about a vertical axis. Previous work showed that the scaling of the correlation length ξ determined from the experimental chaotic patterns disagreed with the prediction from a Ginzburg-Landau weakly-nonlinear model.[2] Commonly the power spectrum of the pattern images (the structure factor) is used to extract ξ from the half-width of its peak. Past experiments and simulations used standard Fourier techniques to calculate the power spectrum. On the basis of simulations using the Swift-Hohenberg equation, we show that those results are influenced strongly by the finite image-size available from experiment. The disagreement between experiment and theory was resolved by using the maximum-entropy method to calculate the power spectra. The maximum-entropy method is not as sensitive to the finite image-size effect. When applied to new experimental images, it yielded results for ξ that were in agreement with the theory.

[1]Work supported by NSF Grant DMR02-43336
[2]Y.-C. Hu, R. Ecke, and G. Ahlers, Phys. Rev. Lett. **74**, 5040 (1995).

Nathan Becker
UC Santa Barbara

Date submitted: 12 Jan 2006

Electronic form version 1.4