Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Flow Equation Approach to the Statistics of Nonlinear Dynamical Systems J.B. MARSTON, SEUNGWOOK MA[1], Brown University, M.B. HASTINGS[2], Los Alamos National Laboratory — The probability distribution function of non-linear dynamical systems is governed by a linear framework that resembles quantum many-body theory, in which stochastic forcing and/or averaging over initial conditions play the role of non-zero $\hbar$. Besides the well-known Fokker-Planck approach, there is a related Hopf functional method[3]; in both formalisms, zero modes of linear operators describe the stationary non-equilibrium statistics. To access the statistics, we investigate the method of continuous unitary transformations[4] (also known as the flow equation approach[5]), suitably generalized to the diagonalization of non-Hermitian matrices. Comparison to the more traditional cumulant expansion method is illustrated with low-dimensional attractors. The treatment of high-dimensional dynamical systems is also discussed.

[1]Supported in part by NSF DMR-0213818.
[2]Supported in part by DOE W-7405-ENG-36.
[3]Uriel Frisch, *Turbulence: The Legacy of A. N. Kolmogorov* (Cambridge University Press, 1995) chapter 9.5.
[4]S. D. Glazek and K. G. Wilson, Phys. Rev. D **48**, 5863 (1993); Phys. Rev. D **49**, 4214 (1994).
[5]F. Wegner, Ann. Phys. **3**, 77 (1994).

Brad Marston
Brown University

Date submitted: 30 Nov 2004 Electronic form version 1.4