Chaotic diffusion in randomly perturbed dynamical systems

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My talk is about the impact of spatial [1] and temporal [2] random perturbations on diffusion in chaotic dynamical systems. As an example, I consider deterministic random walks on a one-dimensional lattice. The system is modeled by a piecewise linear map defined on the unit interval which depends on two control parameters and is lifted onto the whole real line. Computer simulations show a rich scenario in the diffusion coefficient of this model by increasing the perturbation strength. Typical signatures of the transition from small to large perturbations are multiple suppression and enhancement of diffusion by approaching basic asymptotic laws for large perturbation strength. These results are reproduced by simple approximations based on the parameter dependence of the unperturbed deterministic diffusion coefficient [3].

[1] R.Klages, Phys. Rev. E 65, 055203(R) (2002)

[2] R.Klages, Europhys. Lett. 57, 796 (2002)

[3] R.Klages, *Microscopic Chaos, Fractals and Transport in Nonequilibrium Statistical Mechanics*, Advanced Series in Nonlinear Dynamics Vol.24 (World Scientific, Singapore, 2007), Part 1.