
Deterministic Noise (beyond averaging and fluctuations)

Carlangelo Liverani*¹

¹Dipartimento di Matematica, University of Rome "Tor Vergata" (Tor Vergata) – Via della Ricerca Scientifica, 00133 Rome, Italy

Abstract

No real dynamical system is totally isolated. Indeed, to completely describe all the possibly relevant degrees of freedom of a system is an impossible task. A rather successful way to account for the discarded degrees of freedom is to model their cumulative effect by some (possibly very small) external noise. Yet, several crucial questions remain:

1. in which precise technical sense the deterministic action of the discarded degrees of freedom can be modelled by a stochastic process;
2. is such an approximation good for long (possibly very long) times;
3. are there phenomena for which the dynamical origin of the “noise” plays a significant role?

In my talk I will discuss a super simple (but far from trivial) deterministic model of the fast-slow type in which such questions can be addressed and answered precisely. In particular, I will compare the behaviour of such a system with the behaviour of a Wentzell-Freidlin type stochastic process. (Work in collaboration with Jacopo de Simoi)

*Speaker