



LABORATOIRE DE MATHÉMATIQUES ET
PHYSIQUE THÉORIQUE - (UMR 6083)
Parc de Grandmont. 37200 Tours. FRANCE

Training course M2

PROPOSED BY

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Random dynamical systems : recurrence properties

We consider here a random process $(X_n)_{n \geq 1}$ sur \mathbb{R}^d whose transitions are controlled by lipschitz continuous maps on \mathbb{R}^d :

$$\forall n \geq 1 \quad X_n := H_n(X_{n-1}),$$

where $(H_n)_n$ is a sequence of independent identically distributed random variables with values in the space of lipschitz continuous functions on \mathbb{R}^d . These proceses have been intensively studied when the functions H_n are affine maps on \mathbb{R} (see for instance [1]). We will read the papers by M. Benda and G.H. Kellerer and study the properties of recurrence/transience of these systems in three cases

1. the case of affine maps on \mathbb{R} and \mathbb{R}^d
2. the case of the “random walk on \mathbb{R}^+ with absorption at 0 ” (with closed relations with the queuing theory)
3. the case of the “reflected random walk on \mathbb{R}^+ ”

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This training course will take place in Tours ; the references proposed below are available contacting M. Peigné

Références

- [1] Babillot, M. & Bougerol, Ph. & Elie, L. : *The random difference equation $X_n = A_n X_{n-1} + B_n$ in the critical case*, Ann. Probab. **25** (1997) 478–493.
- [2] Benda, M. : *A reflected random walk on the half line*, unpublished preprint, Ludwig-Maximilians-Universität München (1999).

- [3] Brofferio, S. : *How a centred random walk on the affine group goes to infinity*, Ann. Inst. H. Poincaré Probab. Statist. **39** (2003) 371–384.
- [4] Kellerer G.H. *Random dynamical systems on ordered topological spaces* Preprint, submitted by G. Winkler.