New Trends in Onedimensional Dynamics
Celebrating the 70th anniversary of Welington de Melo

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Title: ***Stochastic perturbations of piecewise continuous maps.***

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Abstract.

We consider a piecewise continuous map $f : X \mapsto X$ with a finite number of continuity pieces on a compact metric space X. We study the ergodic properties of the stochastic dynamical system (X, fP_ϵ), obtained by adding at each iterate of f a noise of level $\epsilon > 0$, namely, a stochastic perturbation of f with family $P_\epsilon = P_\epsilon(x, \cdot)$ of transition probabilities, supported on the ball $B_\epsilon(f(x))$ for each $x \in X$.

We construct a transfer operator $\mathcal{L}_\epsilon^*$ in the space of probability measures, whose fixed points are the stationary measures of (X, f, P_ϵ). Under mild hypothesis on the transition probabilities, we prove the existence and finitude of ergodic stationary probability measures μ. We also prove that for each ergodic μ there exists a unique maximal period $p \geq 1$ and a $\mathcal{L}_\epsilon^*$-periodic probability measure ν with period p, such that $\mu = (1/p) \sum_{j=0}^{p-1} \mathcal{L}_\epsilon^{*j} \nu$. Finally, we prove that the ergodic periodic measures ν of maximal period are weakly mixing and also ergodic for all the multiples of $\mathcal{L}_\epsilon^{*p}$.

This is a joint work with Pierre Guiraud, Arnaldo Nogueira and Sandro Vaienti.