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Title: Existence of invariant densities for semiflows with jumps.

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Review text:

The paper derives extreme value results for real-valued random variables defined on a dynamical system on the torus. Specifically, let $\mathbb{T}^2 = \mathbb{R}^2/\mathbb{Z}^2$ be the standard 2-dimensional torus. Let L be a linear map on $\mathbb{R}^2$ with integer entries and determinant 1, with one contracting and one expanding eigendirection, and let T be the induced smooth diffeomorphism (an Anosov map) on the torus. Let d be the Euclidean distance and set

$$\varphi(z) := -\log d(z, \zeta), \quad z \in \mathbb{T}^2,$$

for some fixed point $\zeta \in \mathbb{T}^2$. Let m be the invariant probability measure for T and define the stationary sequence of random variables

$$X_i := \varphi \circ T^i, \quad i = 0, 1, \dots ,$$

and set

$$M_n := \max\{X_0, \dots , X_n\}.$$

Let u_n be a numerical sequence such that

$$\lim_{n\to\infty} n\, m\{z : X_0(z) > u_n\} = \tau \geq 0.$$

The first result of the paper is that

$$\lim_{n\to\infty} m\{M_n \leq u_n\} = e^{-\vartheta\tau},$$

where $\vartheta = 1$ if ζ is not a periodic point for the dynamics, whereas, if ζ is period with period a prime number q, then $\vartheta \neq 1$ is an explicitly computed function of the eigenvalues of L and q. The second result is similar to the first one, but a different metric is used. Namely, the metric is taken to be ℓ^∞ in the basis of the eigenvectors of L. To exhibit these results, the authors verify that certain mixing-type conditions are satisfied. The results imply that return times to small balls centered at non-periodic points follow a Poisson law, whereas the law is compound Poisson if the balls are centered at periodic points.