

A simple non-chaotic map generating subdiffusive, diffusive, and superdiffusive dynamics

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Consider equations of motion that generate dispersion of an ensemble of particles in the long time limit. An interesting problem is to predict the diffusive properties of such a dynamical system starting from first principles. Motivated by conflicting numerical results on diffusion in polygonal billiards, we introduce an interval exchange transformation lifted onto the whole real line that mimicks deterministic diffusion in these billiards. By definition our simple map model is not chaotic, in the sense of exhibiting a vanishing Lyapunov exponent. We show analytically that it nevertheless displays a whole range of normal and anomalous diffusion under variation of a single control parameter [1].

[1] L. Salari et al., *Chaos* **25**, 073113 (2015)