Foreword

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The study of statistical properties of dynamical systems is a very active direction in modern ergodic theory. Roughly speaking, we identify two main themes: the first is to look for probabilistic features of deterministic dynamical systems; the second is to make the system itself random by adding noise to the system. The majority of the papers in this issue address the first of these themes.

The papers by Freitas and Haydn deal with a quantitative study of recurrence for mixing measures, by looking respectively at the extreme values statistics and at the statistics of successive and multiple returns in small sets: in both cases one gets precise estimates on the occurrence of rare events. Recurrence reflects the dynamical properties of ergodic measures; their geometrical properties are instead captured by multifractal analysis. Iommi and Todd describe the multifractal structure and the thermodynamic formalism of multimodal maps by looking at inducing schemes for such maps. The article by Bruin and Van Strien explores the detailed structure, in the category of multimodal interval maps, of the level sets of constant topological entropy. Perturbations of dynamical systems lead one to construct and define open and random systems: in both cases the question of (some sort of stability) is one of the challenges. Demers's article looks at the persistence of a spectral gap for the transfer operator associated with the billiard map in the presence of small holes. The paper by Shen and Van Strien studies stochastic stability, in the strong sense, for a class of maps of the interval with a neutral fixed point and perturbed with additive noise. Finally the article by Chen, Hu and Pesin addresses the question of the extent to which one kind of statistical behaviour precludes another by showing natural examples of coexistence of hyperbolic and non-hyperbolic behaviour in dynamics, in particular in smooth conservative systems.

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