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★Thermodynamic formalism for random transformations and statistical mechanics. (English summary)

The authors consider random transformations on a compact metric space which expand distances in average. Examples for such transformations are provided by smooth random dynamical systems on a compact connected Riemannian manifold, iterated function systems on a compact Hausdorff metric space and random subshifts of finite type. For these systems the expanding in average condition is presented, and for the situation that it holds, unique equilibrium states with respect to random Hölder continuous functions are constructed and their ergodic and mixing properties are discussed. In particular the case of SRB-measures is considered.

All such measures are constructed using random transfer operators. Alternatively, it is also proposed to obtain them as Gibbs states in the sense of statistical mechanics. The notion of Gibbs states corresponding to potentials provided by random Hölder continuous functions is introduced via conditional Gibbs distributions on discrete subsets of preimages. The uniqueness problem is considered in detail by studying thermodynamic limits and in particular the influence of the boundary conditions, which are given by the points defining the discrete subsets by its preimages. Moreover the relation of Gibbs states to equilibrium states is discussed. For random subshifts of finite type the correspondence to one-dimensional lattice spin systems in a random environment with Gibbs states for exponentially fast decaying interactions is explained in detail.

{For the collection containing this paper see MR1359087}

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