This paper studies a random walk in a random potential of the following type: the (negative of the) energy of a path segment \((\gamma(n_1), \gamma(n_1 + 1), \ldots, \gamma(n_2))\) on \(\mathbb{Z}^d\) is of the form \(\sum_{n=n_1+1}^{n_2} V(\gamma(n))B_n\) where \(V\) is a deterministic, bounded function on \(\mathbb{Z}^d\) and the \(B_n\)'s are \(\pm 1\)-valued fair coin tosses. The admissible paths \(\{\gamma(n)\}\) are “lazy” random walk paths on \(\mathbb{Z}^d\): \(|\gamma(n+1) - \gamma(n)| \leq 1\).

Two results for this model are presented under the assumption that \(V\) has a maximum at the origin that is large enough relative to the values \(\{V(x): x \neq 0\}\). First, a random dynamical system (cocycle) defined by the polymer measures is shown to have a random eigenfunction that also appears as an attractor for both forward and backward iterations. Second, the Gibbs specification on paths defined by the polymer distributions possesses an infinite volume Gibbs measure. Among measures that satisfy a certain asymptotic assumption this Gibbs measure is unique and its marginals obey exponential decay. The technical interest here lies in the feature that the “spin variables” \(\gamma(n)\) are unbounded.

References

Note: This list reflects references listed in the original paper as accurately as possible with no attempt to correct errors.

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