Mathematics > Dynamical Systems

Random fields on model sets with localized dependency and their diffraction

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For a random field on a general discrete set, we introduce a condition that the range of the correlation from each site is within a predefined compact set D. For such a random field omega defined on the model set Lambda that satisfies a natural geometric condition, we develop a method to calculate the diffraction measure of the random field. The method partitions the random field into a finite number of random fields, each being independent and admitting the law of large numbers. The diffraction measure of omega consists almost surely of a pure-point component and an absolutely continuous component. The former is the diffraction measure of the expectation E[omega], while the inverse Fourier transform of the absolutely continuous component of omega turns out to be a weighted Dirac comb which satisfies a simple formula. Moreover, the pure-point component will be understood quantitatively in a simple exact formula if the weights are continuous over the internal space of Lambda Then we provide a sufficient condition that the diffraction measure of a random field on a model set is still pure-point.

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