Spectral Measure Computations for Composite Materials

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Responses to Referee Reviews

(I) In the numerical section (section 3), there appear to be no information on which method the eigenvectors and eigenvalues of the symmetric matrix M_1 are computed with, the complexity of the method as a function of the matrix size N.

We have included in the revision of the manuscript a detailed discussion regarding our numerical method, including: the specific algorithm used to compute the eigenvalues and eigenvectors underlying the spectral measure, the size of the data sets used to compute statistical quantities, as well as details regarding the computation of the spectral functions (spectral measure histograms). The computational cost of the simulations was also mentioned.

(I) How large is N to be able to approximate well the infinite lattice ? What does such N depend on ?

We discussed in the revision of the manuscript that our computation of the values of the effective conductivity, for example, are reasonably accurate even for small system sizes L, and that the accuracy increases with increasing system size. In particular, we considered microstructures that are statistically self-dual for infinite systems. In this infinite setting, the spectral measure and the value of the effective conductivity are explicitly known. The deviation of our computed values of effective conductivities for such composite microstructures, relative to the theoretical prediction for infinite systems, is of the order 10% for L=15 and 1% for L=60, and continues to decrease with increasing system size L. The size N of the matrix is dL^d, *where d is the dimension of the system.*