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Characterizing Scattering Properties of Fractal Systems via Their Light Localization Properties ETHAN AVERY, PEEYUSH SAHAY, MATTHEW ROBINSON, PRABHAKAR PRADHAN, Univ of Memphis — Self-similar characteristics of fractal systems mimic many random continuous optical media such as porous systems, glassy materials, biological tissues and cells, etc. We performed a rigorous statistical analysis of scattering properties of fractal systems via examining their 'degree of structural disorder.' Our study focused on quantifying the degree of structural disorder of numerical model generated fractal matric lattices with systematic changes of the fractal dimensionality. For this, we evaluated the light localization properties of the media to determine the optimal scattering of the lattice media. The degree of structural disorder was calculated using the Inverse Participation Ratio (IPR) of the eigenfunctions of the light waves obtained from Anderson disorder tight binding Hamiltonian of the media with closed boundary conditions. The Fractal Dimension (FD) was calculated using the box counting method. The IPR was calculated for each system and plotted as a function of fractal dimension for two and three dimensional systems. The results show a non-monotonous behavior of the degree of structural disorder with the fractal dimension due to the competition between optical mass density points and the scattering capability of the system.

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