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On the local nature and scaling of chaos in weakly nonlinear disordered chains

The dynamics of a disordered nonlinear chain can be either regular or chaotic with a certain probability. The chaotic behavior is often associated with the destruction of Anderson localization by the nonlinearity. In the present work, it is argued that at weak nonlinearity chaos is nucleated locally on rare resonant segments of the chain. Based on this picture, the probability of chaos is evaluated analytically. The same probability is also evaluated by direct numerical sampling of disorder realizations, and quantitative agreement between the two results is found.