More refined multifractal spectra for Bedford-McMullen carpets

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Abstract:

For a self-affine measure μ on a Bedford McMullen carpet, one can computethe multifractal spectrum. This is an evaluation of the Hausdorff dimension for the set of points with prescribed local dimension α.

King computed this for carpets with a separation condition, which was later lifted by Jordan and Rams.

We can also consider the set of points for which the local dimension does not exist, and consider for these points the value taken by the upper and lower local dimension. We wish to understand the behaviour of these spectra. We exhibit an example for which there is a strict inequality between the new and old spectra, and for which phase transitions occur.