

## *Abstract*

Multifractal analysis has been recognized as a powerful tool in characterizing textures. Several studies have shown the possibilities offered by multifractal analysis in image processing, in particular in classification of complex textures. Indeed, in most cases, the mode of multifractal spectrum is used for classification; in this study, we propose two different methods to estimate this spectrum. This paper focuses on the classification of Brodatz textures using multifractal analysis. Two methods are considered: The first method is based on the multifractal formalism of Frish and Parisi through the Legendre transform, the second one is a direct method based on the box-counting algorithm. For both approaches, we used the multiresolution coefficients of the wavelet transform, with the Gaussian first order derivative to find singularity exponents in the direct method, and the leaders coefficients for the multifractal formalism. The Legendre transform was used to estimate the multifractal spectrum, while the box-counting method was used to compute the Hausdorff dimension of sets of the same degree of singularity. Results demonstrate that it is more interesting in some cases to use the box-counting method than the Legendre transform to obtain a more accurate spectrum, as in the bimodal spectrum case