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The 2-microlocal formalism. (English) [Zbl 1093.28006](#)

Lapidus, Michel L. (ed.) et al., Fractal geometry and applications: A jubilee of Benoît Mandelbrot. Multifractals, probability and statistical mechanics, applications. In part the proceedings of a special session held during the annual meeting of the American Mathematical Society, San Diego, CA, USA, January 2002. Providence, RI: American Mathematical Society (AMS) (ISBN 0-8218-3638-2/v.2; 0-8218-3292-1/set). Proceedings of Symposia in Pure Mathematics 72, Pt. 2, 153-215 (2004).

Summary: This paper is devoted to the study of a fine way to measure the local regularity of distributions. Starting from the 2-microlocal analysis introduced by J.-M. Bony, we develop a 2-microlocal formalism, much in the spirit of the multifractal formalism. This allows to define a new regularity function, that we call the 2-microlocal spectrum. The 2-microlocal spectrum proves to be a powerful tool that we apply in three directions. First, it allows to recover all previously known results on local regularity exponents, as well as to discover new properties about them. Second, the 2-microlocal spectrum provides a deeper understanding of the 2-microlocal frontiers. It yields in particular a natural way of prescribing these frontiers on a countable dense set of points. Finally, we explore the close parallel between the multifractal and 2-microlocal formalisms. These applications are illustrated on examples such as the Weierstrass and the Riemann functions, as well as lacunary wavelet series.

For the entire collection see [\[Zbl 1055.37003\]](#).

MSC:

- [28A80](#) Fractals
- [26A16](#) Lipschitz (Hölder) classes
- [42C40](#) Nontrigonometric harmonic analysis involving wavelets and other special systems
- [26A27](#) Nondifferentiability (nondifferentiable functions, points of nondifferentiability), discontinuous derivatives

Cited in **1** Review
Cited in **10** Documents

Keywords:

[2-microlocal spaces](#); [Hölder exponents](#); [wavelet analysis](#); [multifractal analysis](#); [Riemann functions](#); [lacunary wavelet series](#)