

Rioul, Olivier**Simple regularity criteria for subdivision schemes.** (English) Zbl 0761.42016
SIAM J. Math. Anal. 23, No. 6, 1544-1576 (1992).

Summary: Convergent subdivision schemes arise in several fields of applied mathematics (computer-aided geometric design, fractals, compactly supported wavelets) and signal processing (multiresolution decomposition, filter banks). In this paper, a polynomial description is used to study the existence and Hölder regularity of limit functions of binary subdivision schemes. Sharp regularity estimates are derived; they are optimal in most cases. They can easily be implemented on a computer, and simulations show that the exact regularity order is accurately determined after a few iterations. Connection is made to regularity estimates of solutions to two-scale difference equations as derived by Daubechies and Lagarias, and other known Fourier-based estimates. The former are often optimal, while the latter are optimal only for a subclass of symmetric limit functions.

MSC:

- [42C15](#) General harmonic expansions, frames
- [46E35](#) Sobolev spaces and other spaces of “smooth” functions, embedding theorems, trace theorems
- [94A12](#) Signal theory (characterization, reconstruction, filtering, etc.)
- [39A10](#) Additive difference equations

Cited in **65** Documents**Keywords:**

subdivision algorithms; Sobolev regularity; convergent subdivision schemes; compactly supported wavelets; Hölder regularity; binary subdivision schemes; two-scale difference equations

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