

**Daubechies, Ingrid; Runborg, Olof; Sweldens, Wim**

**Normal multiresolution approximation of curves.** (English) Zbl 1051.42025  
*Constructive Approximation* 20, No. 3, 399-463 (2004).

Subdivision is a powerful procedure for iteratively creating smooth curves and surfaces. Combined with wavelet methods, subdivision can be used to approximate functions, curves, and surfaces. The authors discuss the multiresolution approximation of a plane curve  $\Gamma$  in detail. A multiresolution approximation of  $\Gamma$  is called normal if all wavelet detail vectors align with a locally defined normal direction which only depends on the coarser levels. Here normal direction means a normal onto an approximation of  $\Gamma$ . This notion is very useful for compression applications.

In this interesting paper, the authors study properties as convergence, speed of convergence, regularity, and stability of a normal multiresolution approximation of  $\Gamma$ . It is shown that these properties critically depend on the underlying subdivision scheme and that in general the convergence of normal multiresolution approximation of  $\Gamma$  equals the convergence of the underlying subdivision scheme. The central idea is to study the normal multiresolution approximation of  $\Gamma$  as a perturbation of a linear subdivision scheme.

Reviewer: [Manfred Tasche \(Rostock\)](#)

**MSC:**

- [42C40](#) Nontrigonometric harmonic analysis involving wavelets and other special systems
- [65D10](#) Numerical smoothing, curve fitting
- [65D17](#) Computer-aided design (modeling of curves and surfaces)
- [65T60](#) Numerical methods for wavelets
- [68U07](#) Computer science aspects of computer-aided design

Cited in **28** Documents

**Keywords:**

subdivision scheme; multiresolution approximation; plane curve; approximation of curves; convergence; regularity; stability

**Full Text:** [DOI](#)