

Povzetek

Motivacija za študij ortonormiranih baz valčkov v tem delu je njihova uporaba na področju obdelave signalov. Delo uvodoma predstavi temeljne pojme teorije valčkov (multiresolucijska analiza, skalirna funkcija, nizkopasovni filter) ter njihove vzročne zveze in konstrukcije. V osrednjem delu je podrobno razčlenjena konstrukcija ortonormiranih baz valčkov s kompaktnimi nosilci (valčki Daubechiesove) preko konstrukcije primerne nizkopasovnega filtra. Glavno vlogo pri tem igra Rieszova lema. V nadaljevanju je obravnavana gladkost različnih valčkov Daubechiesove. Sklepno poglavje poda algoritme za risanje valčkov Daubechiesove ter za hitro diskretno transformacijo z valčki. Poudarek je na prikazu uporabe valčkov Daubechiesove v primeru stiskanja zvoka ter primerjavi njihove učinkovitosti.

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Ključne besede: harmonična analiza, časovno frekvenčna lokalizacija, valčki, transformacije z valčki, multiresolucijska analiza, skalirna funkcija, nizkopasovni filter, valčki Daubechiesove, obdelava signalov, stiskanje zvoka

Abstract

The study of orthonormal wavelet bases in this work is motivated by their applications in signal processing. Basic terms of wavelet theory (multiresolution analysis, scaling function, low-pass filter) are introduced and their causal relations and constructions are described. In the central chapter the construction of orthonormal bases of compactly supported wavelets (Daubechies wavelets) is studied in detail, the main part being the construction of a suitable low-pass filter through Riesz lemma. The smoothness of these wavelets is studied additionally. The concluding chapter gives algorithms for drawing graphs of Daubechies wavelets and for Fast discrete wavelet transformation. As a central part it demonstrates the use of Daubechies wavelets in sound compression, comparing their effectiveness.

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Key words: harmonic analysis, time-frequency localization, wavelets, wavelet transformations, multiresolution analysis, scaling function, low-pass filter, Daubechies wavelets, signal processing, compression of audio signals

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