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*EMS Series of Lectures in Mathematics*

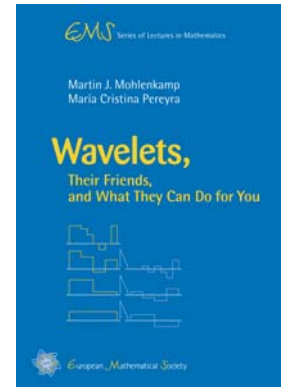
**Martin J. Mohlenkamp, María Cristina Pereyra**

**Wavelets, Their Friends,  
and What They Can Do for You**

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So what is all the fuss about wavelets?

You can find out by reading these notes. They will introduce you to the central concepts surrounding wavelets and their applications. By focusing on the essential ideas and arguments, they enable you to get to the heart of the matter as quickly as possible. They then point you to the appropriate places in the literature for detailed proofs and real applications, so you can continue your study.

They begin with the notion of time-frequency analysis, present the multiresolution analysis and basic wavelet construction, introduce you to the many friends, relatives and mutations of wavelets, and finally give a selection of applications.

They are suitable for beginning graduate students and above. A preliminary chapter containing some of the prerequisite concepts and definitions is included for reference.

**Contents:**

**Preliminaries**

Notation · Plain bases and unconditional bases · Orthogonal bases and frames · Orthogonal projections and complements

**Time-frequency analysis**

Fourier analysis · The windowed Fourier transform and Gabor bases · Local trigonometric expansions · The wavelet transform

**Multiresolution analysis and wavelets**

Multiresolution analysis · The Haar wavelet and MRA · Algorithm: The fast wavelet transform · Daubechies style wavelets · Other plain wavelets

**Friends, relatives, and mutations of wavelets**

Biorthogonal MRA and wavelets · Multiwavelets · Wavelets in 2-D · Wavelet packets · Second generation wavelets · An alternative localization notion and the prolate spheroidal wave functions

**Assorted applications**

Signal/image processing · Calculus with wavelets · Applications to functional analysis · Applications to differential equations

**References and further reading**

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