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★**Wavelets, their friends, and what they can do for you.**

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From the preface: "The goal of these lecture notes is to introduce the central concepts surrounding wavelets and their applications as quickly as possible. They are suitable for beginning graduate students and above. We focus here on *ideas* and then indicate where the details can be found. Thus these notes do not attempt to replace a comprehensive textbook for a course. We hope that these notes will help readers to begin their adventures with wavelets.

"A main purpose of language is to give us the ability to encode, transmit, and extract information efficiently. In situations when words fail us, other methods, such as the musical score, become a type of language. Mathematics is a language (or collection of languages), since it gives us an ability to 'talk' about functions, operators, and other objects. When people encounter things that are 'indescribable' in their current language(s), they try to develop a new language to capture it. For this reason, harmonic analysts developed powerful time/frequency tools, electrical engineers developed subband coding, and quantum physicists developed tools to understand coherent states. In the late 1980s researchers in these fields started to realize that the languages they were creating had much in common, and that the core of these languages could be combined into a single language. Hence the language that is now called wavelet theory was born.

"Among the most spectacular and well-known early applications of wavelets are the wavelet-based FBI standard for storing, searching and retrieving fingerprints, and the wavelet-based JPEG-2000 standard for image compression and transmission used widely on the internet. In the initial excitement, there were highly exaggerated claims made about the power of wavelets. Wavelets are not a miracle solution, however. They are just a library of bases that is appropriate for a large number of situations where the traditional tools, Fourier analysis for example, do not work very well. Wavelets have now matured to become part of the standard curriculum in electrical engineering, statistics, physics, mathematical analysis and applied mathematics. They have become part of the toolbox used for statistics, signal and image processing, medical imaging, geophysics, speech recognition, video coding, internet communications, economics, etc. There are still many problems that cannot be described well with our current language. People keep designing new tools, and the wavelet language still evolves."