Four Short Courses on Harmonic Analysis
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Applications of harmonic analysis pertain to many fields in engineering and science. Examples include time-frequency analysis of machine noise, signal analysis for machine health monitoring, analysis of auditory signals, disturbance identification for adaptive control, image processing and medical imaging. Advancement towards establishing an underlying mathematical theory to unify existing analysis techniques would be extremely useful.

In *Four Short Courses on Harmonic Analysis*, the authors introduce the reader to their recent work in new areas of harmonic analysis. These four topics represent new trends and directions in what the book defines as the modern harmonic analysis. The said analysis is based on the wavelet theory, Banach algebras, classical Fourier analysis, time-frequency analysis, fractal geometry and other related topics. The treatment of each topic is primarily mathematical, mostly targeting pure mathematicians and mathematical physicists in the fields of image and signal processing.

Following an introduction to the basic mathematics of time-frequency analysis, the remaining four chapters, each by a different author, detail a separate topic. The topics include: 1) The theory of frames and bases with focus on B-Spline generators, 2) wavelets with composite dilations for applications in image denoising and edge detection, 3) wavelets on spheres for analysis of data in geophysics, computer graphics and computer vision and 4) the theme and variation of Wiener's Lemma which pertain to convolution operator for many time-invariant systems in engineering. The book focuses on advanced topics in harmonic analysis, mostly from mathematical and signal processing bases. As such, the exercises at the end of each chapter primarily seek mathematical proofs. Some chapters include a practical example.

As an engineer, I found the book helpful in providing mathematical basis/direction for new techniques in time-frequency analysis of signals. The book (and, the *Applied and Numerical Harmonic Analysis* book series) could have provided more practical application examples for engineers, who are the primary users of such tools in many disciplines.

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