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on \mathbb{R}^d and on LCA groups; 4.1 The Euclidean Fourier transform; 4.2 Method of stationary or nonstationary phases; 4.3 The Fourier transform on locally compact Abelian groups; Notes
5 Introduction to probability theory 5.1 Probability spaces; independence; 5.2 Sums of independent variables; 5.3 Conditional expectations; martingales; Notes; 6 Fourier series and randomness; 6.1 Fourier series on $L^1(T)$: pointwise questions; 6.2 Random Fourier series: the basics; 6.3 Sidon sets; Notes; 7 Calder on-Zygmund theory of singular integrals; 7.1 Calder on-Zygmund kernels; 7.2 The Laplacian: Riesz transforms and fractional integration; 7.3 Almost everywhere convergence; homogeneous kernels; 7.4 Bounded mean oscillation space; 7.5 Singular integrals and A_p weights
7.6 A glimpse of H^1 -BMO duality and further remarks Notes; 8 Littlewood-Paley theory; 8.1 The Mikhlin multiplier theorem; 8.2 Littlewood-Paley square-function estimate; 8.3 Calderon-Zygmund H older spaces, and Schauder estimates; 8.4 The Haar functions; dyadic harmonic analysis; 8.5 Oscillatory multipliers; Notes; 9 Almost orthogonality; 9.1 Cotlar's lemma; 9.2 Calderon-Vaillancourt theorem; 9.3 Hardy's inequality; 9.4 The $T(1)$ theorem via Haar functions; 9.5 Carleson measures, BMO, and $T(1)$; Notes; 10 The uncertainty principle; 10.1 Bernstein's bound and Heisenberg's uncertainty principle
10.2 The Amrein-Berthier theorem 10.3 The Logvinenko-Sereda theorem; 10.4 Solvability of constant-coefficient linear PDEs; Notes; 11 Fourier restriction and applications; 11.1 The Tomas-Stein theorem; 11.2 The endpoint; 11.3 Restriction and PDE; Strichartz estimates; 11.4 Optimal two-dimensional restriction; Notes; 12 Introduction to the Weyl calculus; 12.1 Motivation, definitions, basic properties; 12.2 Adjoints and compositions; 12.3 The L^2 theory; 12.4 A phase-space transform; Notes; References; Index

Sommario/riassunto

This two-volume text in harmonic analysis introduces a wealth of analytical results and techniques. It is largely self-contained and will be useful to graduate students and researchers in both pure and applied analysis. Numerous exercises and problems make the text suitable for self-study and the classroom alike. This first volume starts with classical one-dimensional topics: Fourier series; harmonic functions; Hilbert transform. Then the higher-dimensional Calderon-Zygmund and Littlewood-Paley theories are developed. Probabilistic methods and their applications are discussed, as are applications of harmonic analysis to partial differential equations. The volume concludes with an introduction to the Weyl calculus. The second volume goes beyond the classical to the highly contemporary and focuses on multilinear aspects of harmonic analysis: the bilinear Hilbert transform; Coifman-Meyer theory; Carleson's resolution of the Lusin conjecture; Calderon's commutators and the Cauchy integral on Lipschitz curves. The material in this volume has not previously appeared together in book form.
