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This book provides the first coherent account of the area of analysis that involves the Heisenberg group, quantization, the Weyl calculus, the metaplectic representation, wave packets, and related concepts. This circle of ideas comes principally from mathematical physics, partial differential equations, and Fourier analysis, and it illuminates all these subjects. The principal features of the book are as follows: a thorough treatment of the representations of the Heisenberg group, their associated integral transforms, and the metaplectic representation; an exposition of the Weyl calculus of pseudodifferential operators, with emphasis on ideas coming from harmonic analysis and physics; a discussion of wave packet transforms and their applications; and a new development of Howe's theory of the oscillator semigroup.... 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The principal features of the book are as follows: a thorough treatment of the representations of the Heisenberg group, their associated integral transforms, and the metaplectic representation; an exposition of the Weyl calculus of pseudodifferential operators, with emphasis on ideas coming from harmonic analysis and physics; a discussion of wave packet transforms and their applications; and a new development of Howe's theory of the oscillator semigroup. "[This book] is a valiant attempt to present an account of [harmonic analysis in phase space], with an emphasis on the analysis-quantum mechanics and pseudodifferential operators.... The author has taken great pains to express himself clearly and ... the notation is consistent throughout.... The author should be congratulated on a very valuable addition to the library of harmonic analysis."—Zentralblatt für Mathematik