PREFACE

The pseudo-differential operator is a generalization of the partial differential operator. Pseudo-differential operators are used extensively in the theory of partial differential equations and quantum field theory by exploiting the theory of the Fourier transform. This thesis treats different aspects and properties of the L_μ^p-spectra of pseudo-differential operators associated with the Bessel operator, Hankel wavelet multipliers, Watson wavelet multipliers, Watson wavelet convolution product and two-wavelet multipliers. This thesis consists of six chapters.

Chapter 1 is introductory, which provides the historical background of the pseudo-differential operators and their spectral properties. We state the definitions and properties of the Fourier transform, the Hankel transform, the Watson transform, the Zemanian space and other spaces. Definitions of localization operators, wavelet multipliers, unitary representation and their basic properties are given.

In chapter 2, the characterizations of the L_μ^p-spectra of pseudo-differential operators associated with the Bessel operator is investigated by exploiting the theory of the Hankel transform for $1 \leq p < \infty$. Some applications related to the essential spectrum of pseudo-differential operators involving the Hankel transform in the Sobolev-type space, and in the heat equation are given.

Chapter 3 describes the Hankel wavelet multiplier associated with the unitary representation and discussed its boundedness on L^p-space for $1 \leq p \leq \infty$, compactness and other properties. It is also shown that the Hankel wavelet multiplier is Hilbert-Schmidt operator and a unitarily equivalent to the Landau-Pollak Slepian operator by taking the Hankel transform technique.

In chapter 4, an L^p-boundedness, compactness and Hilbert-Schmidt class of wavelet multiplier associated with the Watson transform are investigated and its various

properties studied. The Landau-Pollak Slepian operator associated with the Watson transform is discussed as an application of wavelet multiplier. The relation between the Watson wavelet multiplier and Sobolev-type space is given and the trace class of the Watson wavelet multiplier is also examined.

In chapter 5, the characterizations of localization operators associated with the integral representation of a locally compact group are discussed and with the help of the Watson transform, its relation with wavelet multipliers is found. We also obtained the trace class and Schatten-von Neumann property of localization operators.

In Chapter 6, utilizing the theory of Watson transform and Watson convolution, we explore the Watson wavelet convolution product and its related properties. The relation between the Watson Wavelet convolution product and Watson convolution is also computed. Watson wavelet transform and its inversion formula are analyzed heuristically. The Watson two-wavelet multipliers and their trace class are derived from the Watson wavelet convolution product.