THE INTEGRAL WAVELET TRANSFORM IN $L^p(\mathbf{R}^n)$, $1 \leq p \leq \infty$ *

Nguyen Minh Chuong [1], **Ta Ngoc Tri** [2]

Abstract

In this paper we are concerned with the construction of the integral wavelet transform in $L_p(\mathbf{R}^n), 1 \leq p \leq \infty$, and some of its properties. Moreover, the asymptotic behaviour of this transform of functions belonging to the space of entire functions of exponential type and the multiresolution approximation of $L^p(\mathbf{R}^n), 1 \leq p \leq \infty$, are also studied.

Mathematics Subject Classification: 42C10, 42C15

Key Words and Phrases: integral wavelet transform, multiresolution approximation, entire functions of exponential type, imbedding Sobolev theorem

1. Introduction

The wavelet analysis and the related pseudodifferential operators' theory play an important role in sciences and technology. They are not only powerful mathematical tools in many exciting and deep investigations into linear and non linear partial differential equations (see [9]), but also have significant physical interpretations and very wide applications (see [2,4,6]).

The Fourier integral transform in the L_2-theory is also popular and is relatively easy to be discussed in the terms of the inner product and the Parseval idendity. In the absence of these tools, the study of the Fourier transform in the settings of the L_p-theory would be much more difficult. So is the case of the integral wavelet transform.

The aim of this paper is to study the integral wavelet transform in $L_p(\mathbf{R}^n), 1 \leq p \leq \infty$ and some of its properties. By the approach in [8] it is not possible to solve the problem in this interesting space. To overcome the difficulty, we have to

* This paper was supported by the National Basis Research Found Grant for Natural Science, Vietnam