

COMPUTABILITY OF THE TRANSLATION OPERATOR

POONAM MANTRY AND S. K. GANDHI[†]

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Abstract. Gabor systems play an important role in various practical problems related to signal and image processing. In this paper, we study the computability of Gabor frames in L^2 . Computable version of some existing results related to Gabor systems are obtained. Also, computability of operators associated with Gabor frames is discussed and the computability of Zak transform is defined. Finally, we discuss the existence of the computable dual frames associated with the Gabor Systems.

1. Introduction

Frames are generalizations of orthonormal basis in Hilbert spaces. The notion of frames was introduced in 1952 by Duffin and Schaeffer [8]. Basis in a Hilbert space H allows every $f \in H$ to be represented as a unique expansion in terms of the basis elements. However, the condition of uniqueness of expansion is very restrictive in nature. Frames are particularly important because they provide the desired flexibility. The redundant nature of frames is a desirable property in many practical problems. Gabor frames play a very important role in signal analysis. They are generated by modulations and translations of one single function.

In this paper, we extend the notion of computability to Gabor frames. We first study the computability of Translation, Modulation and Dilation operators. We then deal with the computable Gabor frames and computable versions of some of the related results. The computability of the Zak Transform, an important tool for analyzing Gabor frames, is also discussed.

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[†] *Corresponding author*