WOVEN K-FRAMES IN QUATERNIONIC HILBERT SPACES

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Abstract. In this paper, we have defined and studied woven K-frames in quaternionic Hilbert spaces. Also, we have studied conditions under which a woven frame(K-frame) form a woven K-frame. Further, we have studied conditions under which a bounded image of woven K-frame forms a woven K-frame. Finally, we prove a perturbation result for woven K-frames in quaternionic Hilbert spaces.

1. Introduction

Frames is an over-redundant family of vectors which was introduced and studied by Duffin and Schaffer [9] in the context of the non-harmonic Fourier series. In the year 1982, it was reintroduced by Daubechies, Grossman, and Meyer [5], and after that many generalizations of frames have been given. For details regarding frames and their applications one may refer to [8] and reference therein. Although, frames have many applications, there are some problems in sampling theory which can not be tackled by frames, which required an atomic system related to a bounded linear operator. In [6], *Găvruta* introduced and studied the K-frames which is a generalization of ordinary frames. Recently in [16], the concept of weaving frames has been introduced by Bemrose et al. , which is used in distributed signal processing. For details regarding weaving K-frames and their properties one may refer to [1, 2, 18, 17].

In 1843, Hamilton discovered the field of quaternions which is the largest non-commutative, associative real algebra generated by $1, i, j, k$. Quaternions are used in quantum mechanics, the theory of relativity, number theory and to study rotation in higher dimensional Euclidean spaces. For details regarding various operations, properties and applications of quaternions, one may refer to [10, 12]. In the case of finite-dimensional quaternionic Hilbert spaces, frame was defined by M. Khokulan, K. Thirulogasanthar and S. Srisatkunarajah [7], further Sharma and Goel [14], has studied frames in quaternionic Hilbert spaces. Recently H. Ellouz [3] has defined and studied the concept of K-frames in quaternionic Hilbert spaces. For details regarding K-frames