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SOME PROPERTIES OF OPV-FRAMES

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Abstract . In quantum mechanics, a Hilbert space administer a structure (linear) for physical states and also provide an inner product to convey physically-measurable expectation values. Keeping this aspect in mind, in this paper, we prove some significant properties concerning operator valued frames (OPV-frames). Also, we construct OPV-frames with the help of some given operators. Finally, we consider perturbation of OPV-frames and discuss the stability of OPV-frames.

1. Introduction

A framework that can be used to describe wave functions in quantum mechanics is a Hilbert Space. Hilbert space administer a structure (linear) for physical states and also provide an inner product to convey physically- measurable expectation values. Wave functions are illustrated over a perticular number field. Assuming that there exists a despondence between the inner product of the Hilbert space and its elements, a wave function demands a scalar product as well as a Hilbert space. In this article, our aim is to study the concept of frame, introduced by Duffin and Schaeffer who while working on a problem of non-harmonic analysis introduced this notion, under the quantum mechinics (QM) setting. The concept of frame is a generalization of basis. It has been studied and developed rapidly in the past 35 odd years mainly due to its useful applications in various areas including signal and image processing. Frames were first introduced in 1952 by Duffin and Schaeffer [10] and were further developed and set in motion by Daubechies, Grossman and Meyer [9] in 1986. Since then, many generalizations like fusion frames, g-frames etc were introduced [2, 11, 18].

A generalization of the concept of vector-valued frame, that enables us to deal with the operators in a Hilbert space instead of its elements, was introduced by L.Găvruta [12]. The notion of OPV-frames, provides a more general way of series expansion of elements that is very similar to frame decomposition and have immense applications in quantum computing, packets encoding and many more. Kaftal [15] proved several