CHAPTER I

INTRODUCTION

The symbols $\mathbb{C}$ and $M_n(\mathbb{C})$ are used to denote the sets of complex numbers and $n \times n$ complex matrices, respectively. It is assumed throughout that $a_0, a_1, a_2 \in \mathbb{C}$ are nonzero complex numbers and $T_0, T_1, T_2 \in M_n(\mathbb{C})$ are nonzero commuting tripotent complex matrices of order n, i.e., $T_i^3 = T_i$, and $T_iT_j = T_jT_i, i, j = 1, 2, 3$. The purpose of this note is to characterize all situations in which a linear combination of T_0, T_1 and T_2 of the from

$$A = a_0T_0 + a_1T_1 + a_2T_2$$

is also an idempotent matrix. A similar problem, concerning the question of when a linear combination

$$T = c_1T_1 + c_2T_2$$

of nonzero tripotent matrices T_1 and $T_2 \in M_n\mathbb{C}$ is tripoten, has been solved by Baksalary, J.K., Baksalary, O.M. & Özdemir H. [3]. From their theorm it follows form that the linear combination of tripotent $T = c_1T_1 + c_2T_2$, where T_1 and T_2 are tripotent, is tripotent. Further results concerning the idempotency of linear combinations of matrices are given in [1, 3].

This thesis is divided into 4 chapter. Chapter 1 is the introduction. Chapter 2, deals with some preliminaries and give some useful results that will be in later chapter. Chapter 3 is the main results of this research, we prove in Section 3.1 Linear Combination of Three Tripotent Matrices and prove in Section 3.2 Linear Combination of Idempotent and Tripotent. The conclusion of research is in Chapter 4.