ELA

IDEMPOTENCE-PRESERVING MAPS BETWEEN MATRIX SPACES OVER FIELDS OF CHARACTERISTIC 2[*]

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Abstract. Let $M_n(\mathbb{F})$ be the space of all $n \times n$ matrices over a field $\mathbb{F}$ of characteristic 2 other than $\mathbb{F}_2 = \{0, 1\}$, and let $P_n(\mathbb{F})$ be the subset of $M_n(\mathbb{F})$ consisting of all $n \times n$ idempotent matrices. Let m and n be integers with $n \geq m$ and $n \geq 3$. We denote by $\Phi_{n,m}(\mathbb{F})$ the set of all maps from $M_n(\mathbb{F})$ to $M_m(\mathbb{F})$ satisfying that $A - \lambda B \in P_n(\mathbb{F})$ implies $\phi(A) - \lambda\phi(B) \in P_m(\mathbb{F})$ for all $A, B \in M_n(\mathbb{F})$ and $\lambda \in \mathbb{F}$. In this paper, we give a complete characterization of $\Phi_{n,m}(\mathbb{F})$.

Key words. Field; Characteristic; Idempotence; Preserving; Homogeneous

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