

ABSTRAK

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**Judul : PASANGAN HIMPUNAN MATRIKS BERBENTUK
ADDITIVE FINITE FREE POSITION (AFFP)**

Penelitian ini membahas pasangan himpunan matriks yang memenuhi kondisi Additive Finite Free Position (AFFP), yaitu kondisi di mana pasangan matriks (A, B) memenuhi $\chi_{A+B}(x) = \chi_A(x) \boxplus \chi_B(x)$ dengan χ menyatakan polinomial karakteristik dan $\boxplus$ menyatakan konvolusi aditif. Penelitian ini menggunakan metode studi literatur dan pembuktian matematis. Hasil penelitian menunjukkan bahwa terdapat tiga pasangan himpunan matriks berukuran 4×4 yang memenuhi kondisi AFFP, yaitu pasangan matriks diagonal dengan matriks *principally balanced* $(\mathcal{D}_4, \mathcal{B}_4)$, pasangan matriks segitiga atas dengan matriks segitiga atas berdiagonal konstan $(\mathcal{R}_4, \hat{\mathcal{R}}_4)$, serta pasangan matriks skalar dengan semua himpunan matriks $(\mathcal{S}_4, \mathcal{M}_4)$. Ketiga hasil tersebut juga telah diverifikasi melalui contoh pada masing-masing pasangan.

Kata Kunci: Matriks, Additive Finite Free Position (AFFP), Konvolusi aditif, polinomial karakteristik.



ABSTRACT

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Title : **PAIRS OF MATRIX SET IN THE ADDITIVE FINITE
FREE POSITION (AFFP)**

This study discusses pairs of matrix sets that satisfy the Additive Finite Free Position (AFFP) condition, namely the condition where a pair of matrices (A, B) satisfies $\chi_{A+B}(x) = \chi_A(x) \boxplus \chi_B(x)$, where χ denotes the characteristic polynomial and $\boxplus$ denotes additive convolution. This study employs a literature review and mathematical proofs. The results show that there are three pairs of 4×4 matrix sets that satisfy the AFFP condition, the pair of a diagonal matrix and a principally balanced matrix $(\mathcal{D}_4, \mathcal{B}_4)$, the pair of an upper triangular matrix and an upper triangular matrix with a constant diagonal $(\mathcal{R}_4, \hat{\mathcal{R}}_4)$, and the pair of scalar matrices with all matrix sets $(\mathcal{S}_4, \mathcal{M}_4)$. These three results have also been verified through examples for each pair.

Keywords: Matrix, Additive Finite Free Position (AFFP), Additive Convolution, Characteristic polynomial.

