

ABSTRAK

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Judul : **Himpunan *Core* pada Ring Matriks 2×2 atas Lapangan Berdasarkan Polinomial Minimal**

Ring matriks ukuran $n \times n$ atas lapangan (F) , $M_n(F)$ merupakan salah satu contoh ring nonkomutatif yang memiliki karakteristik berbeda dengan ring komutatif, khususnya dalam pembentukan ideal nol dari suatu subhimpunan matriks. Pada ring nonkomutatif, ideal nol hanya merupakan ideal kiri sehingga tidak selalu ideal dua sisi. Penelitian ini bertujuan untuk mengkaji karakterisasi himpunan *core* secara khusus pada ring matriks $M_2(F)$ melalui pendekatan kelas polinomial minimal dengan mengkaji teori ring, ring polinomial, ideal nol, polinomial minimal, dan matriks blok Vandermonde berdasarkan hasil penelitian Werner (2022). Hasil penelitian menunjukkan bahwa karakterisasi himpunan *core* pada $M_2(F)$ dapat ditentukan melalui distribusi kelas polinomial minimal matriks penyusunnya. Lebih lanjut, penggunaan matriks blok Vandermonde memberikan kriteria yang lebih sederhana dalam menentukan apakah suatu subhimpunan matriks memiliki ideal nol yang merupakan ideal dua sisi.

Kata Kunci: Ring Matriks, Ideal Nol, Himpunan *Core*, Polinomial Minimal, Matriks Blok Vandermonde.



ABSTRACT

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Title : *Set In The Ring Of 2×2 Matrix Over Field Based On A Minimal Polynomial*

The ring of $n \times n$ matrices over a field F , denoted as $M_n(F)$, is a prominent example of a non-commutative ring that exhibits distinct characteristics compared to commutative rings, particularly regarding the formation of the vanishing ideal of a matrix subset. In non-commutative rings, a vanishing ideal is inherently a left ideal, meaning it is not always a two-sided ideal. This study aims to investigate the characterization of the core set specifically within the matrix ring $M_2(F)$ using a minimal polynomial class approach. This is achieved by examining ring theory, polynomial rings, vanishing ideals, minimal polynomials, and Vandermonde block matrices, building upon the findings of Werner (2022). The results demonstrate that the characterization of the core set in $M_2(F)$ can be determined through the distribution of the minimal polynomial classes of its constituent matrices. Furthermore, the application of Vandermonde block matrices provides a simpler criterion for determining whether a given subset of matrices yields a vanishing ideal that is also a two-sided ideal.

Keywords: *Matrix Ring, Null Ideal, Core Set, Minimal Polynomial, Block Vandermonde Matrix.*

