

ABSTRAK

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Judul : Matriks Tridiagonal Bersifat P-IDP+ dan PD

Penelitian ini menganalisis apakah matriks tridiagonal simetris dengan sifat *Inverse Diagonal Property* positif (P-IDP+) berordo $n \times n$ merupakan matriks *positive definite* (PD), serta menentukan syarat perlu agar hal tersebut terpenuhi. Metode yang digunakan meliputi studi literatur dan analisis teoritis terhadap determinan, invers, nilai eigen, dan leading principal minor. Hasil menunjukkan bahwa untuk $n < 6$, matriks P-IDP+ selalu PD jika semua leading principal minor-nya positif. Namun, untuk $n \geq 6$, diperlukan syarat tambahan seperti kepositifan determinan submatriks tertentu. Contoh numerik membuktikan bahwa determinan positif tidak menjamin semua nilai eigen atau minor utama bernilai positif. Disimpulkan bahwa semua matriks PD termasuk P-IDP+, namun tidak semua P-IDP+ bersifat PD tanpa syarat tambahan pada ordo besar. Temuan ini menunjukkan bahwa struktur matriks tridiagonal, sifat P-IDP+, dan syarat untuk menjadi matriks *positive definite* saling berhubungan erat.

Kata Kunci: Matriks tridiagonal, *Inverse Diagonal Property* (IDP), *positive definite*, *leading principal minor*, determinan.

ABSTRACT

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Tittle : ***Tridiagonal Matrix with P-IDP⁺ and PD Properties***

This study examines whether a symmetric tridiagonal matrix with the positive Inverse Diagonal Property (P-IDP⁺) of order $n \times n$ is positive definite (PD) and identifies the necessary conditions for it to be so. The methodology involves a literature review and theoretical analysis of determinants, inverses, eigenvalues, and leading principal minors. The results indicate that for $n < 6$, a P-IDP⁺ matrix is always PD if all its leading principal minors are positive. However, for $n \geq 6$, additional conditions—such as the positivity of determinants of specific submatrices—are required. Numerical examples show that a positive determinant alone does not guarantee that all eigenvalues or leading principal minors are positive. In conclusion, while every PD matrix falls within the P-IDP⁺ class, not every P-IDP⁺ matrix is PD without extra conditions for larger orders. These findings demonstrate a close interrelationship between the structure of tridiagonal matrices, the P-IDP⁺ property, and the criteria for positive definiteness.

Keywords: *Tridiagonal matrix, Inverse Diagonal Property (IDP), positive definite, leading principal minor, determinant.*