

# Polinomial Karakteristik dan Nilai Eigen Beberapa Matriks Representasi dari Graf Prisma Berarah Siklik = Characteristic Polynomials and Eigenvalues of Several Matrices of Directed Cyclic Prism Graph

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## Abstrak

Graf prisma adalah graf yang bersesuaian dengan kerangka bangun ruang prisma. Hanya graf prisma berarah siklik dengan pola tertentu yang diperhatikan dalam penelitian ini. Graf prisma berarah siklik dinotasikan  $(m;3)$ , di mana  $m$  adalah setengah jumlah simpul, dan memiliki  $2m$  simpul dan  $3m$  busur. Sebuah graf dapat direpresentasikan menggunakan sebuah matriks. Ada beberapa jenis matriks yang biasanya digunakan dalam merepresentasikan graf. Diantaranya adalah matriks adjacency, anti-adjacency, dan Laplacian yang dibahas dalam penelitian ini. Polinomial karakteristik dari matriks adjacency, matriks anti-adjacency, dan matriks Laplacian dari graf prisma berarah siklik  $(m;3)$  diperoleh beserta nilai-nilai eigen real dan kompleksnya. Metode yang digunakan untuk membuktikan hasil-hasil penelitian ini adalah operasi baris matriks dan faktorisasi. Adapun untuk polinomial karakteristik dari matriks anti-adjacency  $(m;3)$ , hasilnya dibuktikan dengan mengamati subgraf terinduksi siklik dan asiklik dari  $(m;3)$ ; berdasarkan sebuah teorema yang ditemukan dalam penelitian sebelumnya.

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A prism graph is a graph which corresponds to the skeleton of a prism. Only directed cyclic prism graphs with certain pattern are considered in this research. The directed cyclic prism graph is denoted  $(m;3)$ , where  $m$  is half the number of vertices, and has  $2m$  vertices and  $3m$  edges. A graph can be represented by using a matrix. There are several types of matrices that are usually used in representing a graph. Among them are the adjacency, anti-adjacency, and Laplacian matrices which are discussed in this research. The characteristic polynomial of the adjacency matrix, the anti-adjacency matrix, and the Laplacian matrix of directed cyclic prism graph  $(m;3)$  are obtained as well as their real and complex eigenvalues. The methods used to prove the results are matrix row operations and factorizations. As for the characteristic polynomial of the anti-adjacency matrix of  $(m;3)$ , the results are proved by observing the both cyclic and acyclic induced subgraphs of  $(m;3)$ ; according to a theorem invented in a previous research