

ABSTRACT

Construction of D-graphs of Graphs with Small
Cyclomatic Numbers

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This thesis deals with the construction of D-graphs of graphs with small cyclomatic numbers.

Let G be a graph with p nodes. The matching polynomial of G is

$$M(G; w_1; w_2) = \sum a_k w_1^{p-2k} w_2^k,$$

where a_k is the number of matchings with k edges and $w_1^{p-2k} w_2^k$ is the monomial we associated with every matching in G with k edges. (and therefore $p-2k$ nodes component nodes); and the summation is taken over all matchings in G .

A D-graph for G , denoted by $D(G)$ is a graph whose determinant of its matching matrix $A(D(G))$ gives the matching polynomial of G . ($D(G)$ and G are co-matching).

The cyclomatic number of a graph G is the $q - p + k$, where p , q and k are the number of nodes, edges and components respectively in G . In this thesis, we identify the D-graphs for the basic graphs with cyclomatic numbers 0, 1 and 2. Moreover, we extend our ideas to the construction of D-graphs of graphs formed by the attachment of trees to the basic graphs.

The study of these D-graphs and proper multi D-graphs has led to many interesting new families of co-matching D-graphs.

Keywords: Andrew Anthony Hunte; Matching polynomial; D-graphs; Multi D-graphs; Cyclomatic number; Symmetric nodes; Attachment of trees.