

ABSTRACT

MATCHING PRECLUSION AND GENERALIZATIONS

by

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A *matching* in a graph is a set of edges such that each vertex of the graph is incident to at most one edge of the matching. A matching is *perfect* if each vertex of the graph is incident to some edge of the matching, and *almost-perfect* if exactly one vertex is not incident to any edge of the matching. In a graph with a perfect or almost-perfect matching, the *matching preclusion number* is the minimum cardinality of a matching preclusion set. The matching preclusion problem was introduced to study the structure of matchings as well as their connections to generalized notions of connectivity. A number of variant problems have also been introduced, which expand on the theory of matching preclusion by imposing additional structure on matching preclusion sets, additionally allowing the deletion of vertices, or changing the specifications of the underlying matching problem. In this work we investigate the matching preclusion problem and its variants, study the structure of optimal sets in some particular families of graphs, and develop general techniques for classifying optimal sets.