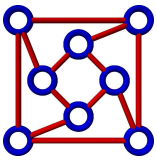

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THE MAX-BOND PROBLEM: SOME RESULTS

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A cut in graph G is called a bond if each of the two parts of the cut induce connected subgraphs in G. Computing the maximum weight bond is an NP-hard problem even for planar graphs. $(K_5 - e)$ graphs present a tractable class of graphs over which this problem can be solved efficiently. A result of Wagner states that such graphs can be decomposed into k-clique-sums of the wheel graph and a few other constant sized graphs, for $k = 1, 2$. Using this decomposition and machinery from computational theories of bounded treewidth graphs, one can derive linear time algorithm for such graphs. We show how to remove this machinery by giving a simple algorithm that works for the wheel graph.
Furthermore, polyhedral charactrization of the band polytope is known only for the graphs in Wagner's decomposition theorem. We show how to obtain linear descriptions of the bond polytope of graphs that are k-sum (for $k = 1, 2$) of other graphs with known bond polytope. As a consquence of this we obtained that the bond problem admits linear size linear programs for $(K_5 - e)$-minor free graphs.
This is joint work with Petr Kolman.