

An Integer Program for Positive Semidefinite Zero Forcing in Graphs

Logan Smith*, Illya Hicks, Rice University

Positive semidefinite (PSD) zero forcing is a dynamic graph process in which an initial set of vertices in a graph is colored and, through a set of color changing rules, may cause additional vertices to become colored through a series of iterations. PSD zero forcing sets are vertex sets which (when initially colored) cause all remaining vertices to become colored; the PSD zero forcing number of a graph is the minimum cardinality of the graph's PSD zero forcing sets. The PSD zero forcing number is of particular interest as it provides a bound for solutions of the zero forcing set problem, the minimum rank problem, and the positive semidefinite minimum rank problem. In this talk, new blocking sets for PSD zero forcing sets called PSD forts are introduced and used to formulate the first integer program (IP) for computing the PSD zero forcing numbers of general graphs.

Keywords: Zero Forcing, Integer Programming, Combinatorial Optimization