

COMPUTING THE STABILITY NUMBER OF A GRAPH VIA SEMIDEFINITE AND LINEAR PROGRAMMING

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ABSTRACT. We study certain semidefinite and linear programming lifting approximation schemes for computing the stability number of a graph. Our work is based on and refines De Klerk and Pasechnik's approach to approximating the stability number via copositive programming (*SIAM J. Optim.* 12 (2002), 875–892).

We show that the *exact* value of the stability number $\alpha(G)$ is attained by the semidefinite approximation of order $\alpha(G) - 1$. We also give a closed-form expression for the values computed by the linear programming approximations. The closed-form expression readily reveals some sharp differences between the linear and the semidefinite approximations. For instance, the value of the linear programming approximation of any order is strictly larger than $\alpha(G)$ whenever $\alpha(G) > 1$.