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E. Nevo and I. Peeva asked the following question.

Question 1 *Let $I(G)$ be the edge ideal of a graph G which does not have any induced four cycle in its complement. If $\text{reg}(I(G)) \leq 3$, then is it true that for all $s \geq 2$, $I(G)^s$ has linear minimal free resolution?*

One important fact about bipartite graphs is that the complement of a bipartite graph cannot have any induced cycle of length greater than four. In light of Fröberg's theorem and this fact, one can say that for bipartite graphs linear presentation implies linear resolution. Due to these, we ask a question similar to Question 1 for bipartite graphs with a weaker hypothesis and answer it in the affirmative:

Theorem 2 *Let G be a bipartite connected graph with edge ideal $I(G)$. If $\text{reg}(I(G)) = 3$ then for all $s \geq 1$, $\text{reg}((I(G))^s) = 2s + 1$.*

References

- [1] E. Nevo and I. Peeva, C_4 -free edge ideals, *J. Algebraic Combin.*, 37(2):243-248, 2013.

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