Small crossing number of join products

Jana Petrillová

(joint work with Marián Klešč)

The crossing number $\mathrm{cr}(G)$ of a graph G is the minimum possible number of edge crossings in any drawing of G in the plane. The join product of two graphs G_1 and G_2 with vertex sets $V(G_1)$ and $V(G_2)$, and edge sets $E(G_1)$ and $E(G_2)$, denoted by $G_1 + G_2$, is obtained from vertex-disjoint copies of G_1 and G_2 by adding all edges between $V(G_1)$ and $V(G_2)$. For $|V(G_1)| = m$ and $|V(G_2)| = n$, the edge set of $G_1 + G_2$ is the union of disjoint edge sets of the graphs G_1, G_2, and the complete bipartite graph $K_{m,n}$.

The investigation on the crossing number of graphs is a classical and very difficult problem. In [1], Kulli at al. started to study line graphs with crossing number one. Later Kulli and Muddebihal gave the characterization for all pairs of graphs for which the crossing number of their join product is zero, see in [2]. In this talk, we give the necessary and sufficient conditions for all pairs of graphs G_1 and G_2 for which the crossing number of their join product $G_1 + G_2$ is one.

REFERENCES

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[2] V.R. Kulli, M.H. Muddebihal, Characterization of join graphs with crossing number zero, Far East J. Appl. Math. 5 (2001), 87–97.