On Generalized Line Graphs

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The line graph $L(G)$ is that graph whose vertices are the edges of G where two vertices in $L(G)$ are adjacent if the corresponding edges are adjacent in G. For an integer $k \geq 2$, the k-line graph of a graph G is the graph whose vertex set is the set of all k-paths (paths of order k) of G where two vertices of the k-line graph are adjacent if they are adjacent k-paths in G. Since the 2-line graph is the line graph for every graph G, this is a generalization of line graphs. In this talk, we focus on 3-line graphs and discuss several of their properties. We show that the 3-line graph of a connected bipartite graph is disconnected with at most two nontrivial components and describe an open question about 3-line graphs with more than two nontrivial components.

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