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Decomposition of Sparse Claw-free Graphs, with Application to Game Coloring

A recent result by Montassier et al. studies decomposition of sparse graphs with its application to graph coloring. We investigate how the result can be improved for claw-free graphs. Let $f(k)$ be the least number such that every claw-free graph with maximum average degree less then $f(k)$ is decomposable into a tree and a graph of maximum degree at most k. We give lower and upper bounds of $f(g)$.