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STRONG CLIQUES IN GRAPHS

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For a graph G, $L(G)^t$ is the t-th power of the line graph of G – that is, vertices of $L(G)^t$ are edges of G and two edges $e, f \in E(G)$ are adjacent in $L(G)^t$ if and only if G contains a path with at most t vertices that starts in a vertex of e and ends in a vertex of f. The *t-strong chromatic index* of G is the chromatic number of $L(G)^t$ and a *t-strong clique* in G is a clique in $L(G)^t$.

Finding upper bounds for the *t-strong chromatic index* and *t-strong clique* are problems related to two famous problems. A well-known conjecture of Erdős and Nešetřil from 1985 states that *t-strong chromatic index* is at most $1.25\Delta^2$ for every graph G with maximum degree Δ. In the degree/diameter problem we ask for the maximum possible number $n_{\Delta,D}$ of vertices in a graph of maximum degree Δ and diameter D.

We prove that the size of a t-strong clique in a graph with maximum degree Δ is at most $1.75\Delta^t + O\left(\Delta^{t-1}\right)$, and for bipartite graphs the upper bound is at most $\Delta^t + O\left(\Delta^{t-1}\right)$.