CSGT 2024, June 3–7 2024, Trojanovice
59th Czech-Slovak Conference on Graph Theory 2024
Department of Applied Mathematics
VŠB – Technical University Ostrava, 17. listopadu 2172/15, Ostrava–Poruba

GENERALIZED LABELLINGS OF CIRCULANT GRAPHS

Přemysl Holub, Martin Kopřiva*

By an $L(3,2,1)$-labelling of a graph G we mean an assignment of non-negative integers to vertices G according to the following rules: adjacent vertices are labelled by values differing by at least 3, vertices at distance two apart are labelled by values differing by at least 2 and vertices at distance three are labelled by values differing by at least 1. It is natural to ask for the smallest positive integer, denoted by $\lambda_{(3,2,1)}(G)$, such that G admits an $L(3,2,1)$-labelling with span $\lambda_{(3,2,1)}(G)$, specifically with values $0,\ldots,\lambda_{(3,2,1)}(G)$.

Let $S \subset [n-1]$, where $n \in \mathbb{N}, n \geq 3$, such that if $x \in S$, then also $(n-x) \in S$. A graph $G = (V(G), E(G))$, where $V(G) = \{u_1, \ldots, u_n\}$ and $E(G) = \{u_i u_j; |u_j - u_i| \in S, i, j \in \{1, \ldots, n\}\}$, is a *circulant* $C_n(S)$ generated by the set S.

In this talk we investigate $L(3,2,1)$-labelling of some circulant graphs. We consider two types of circulants: dense ($|S| \geq \frac{n}{2}$) and sparse ($|S| = 3$ or $|S| = 4$). We establish some exact values and bounds for $\lambda_{(3,2,1)}(G)$ for these circulants.