Irregularity strength of regular graphs

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Abstract

Let G be a simple graph with no isolated edges and at most one isolated vertex. For a positive integer w, a w-weighting of G is a map $f : E(G) \to \{1, 2, \ldots, w\}$. An irregularity strength of G, $s(G)$, is the smallest w such that there is a w-weighting of G for which $\sum_{e:u\in e} f(e) \neq \sum_{e:v\in e} f(e)$ for all pairs of different vertices $u, v \in V(G)$. A conjecture by Faudree and Lehel says that there is a constant c such that $s(G) \leqslant \frac{n}{d} + c$ for each d-regular graph G, $d \geqslant 2$. We show that it is true in the following form $s(G) \leqslant c_1 \frac{n}{d} + c_2$, where $c_1 = 16$ and $c_2 = 6$. Consequently, we improve the results by Frieze, Gould, Karoński and Pfender (in some cases by a $\log n$ factor) in this area, as well as the recent result by Cuckler and Lazebnik.

Keywords: irregularity strength, graph weighting, regular graph

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