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Graph Classes with Near-Equality of Independence Numbers and Havel–Hakimi Residues

The residue $r(G)$ of a graph G is the number of zeros remaining upon completion of the Havel–Hakimi algorithm on the degree sequence of G. It is one of the best known lower bounds on the independence number $\alpha(G)$ of a graph in terms of the degree sequence, though the bound may be arbitrarily weak. We describe progress in characterizing the maximal hereditary class $\mathcal{H}$ of graphs G for which $r(G) = \alpha(G)$. In particular, we determine all minimal forbidden subgraphs of $\mathcal{H}$ having order at most 10 and show that various (nearly-)hereditary families belong to $\mathcal{H}$ (or nearly do).