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DiMaS

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Highly irregular supermagic graphs

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Let $G = (V, E)$ be a graph with m edges. A bijection $f : E \rightarrow \{a, a + 1, \dots, a + m - 1\}$ for some integer a is called a *supermagic labeling* of G if for every vertex v the sum of edge-labels of all edges adjacent to v is equal to the same integer k . The constant k is the *magic constant* of f and any graph which admits a supermagic labeling is a *supermagic graph*. The concept of magic graphs (with arbitrary real labels) is one of the oldest labeling concepts. It originated by Sedláček in 1963. Supermagic labelings were introduced by Stewart in 1967.

Dozens of papers have been published on supermagic labelings, mostly providing constructions of supermagic labelings of a specific class of graphs as well as some necessary conditions for the graph to allow a supermagic labeling. The proofs are mostly constructive, usually providing a labeling technique for regular or almost regular graphs. Some supermagic graphs with different degrees were provided by Ivančo and Semaničová in 2005 or Ivančo and Polláková in 2012 and 2014. Recently we obtained a general construction of supermagic graphs with arbitrarily many different degrees. Today we present the result as well as some open problems in this area.