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On Zero Sum 5-flow Conjecture

N. Ghareghani
School of Mathematics
Institute for Studies in Theoretical Physics and Mathematics (IPM)
&
University of Tehran
Tehran, Iran

A celebrated conjecture of Tutte (1954) says that every bridgeless directed graph has a nowhere-zero 5-flow. In 1981, Seymour proved that every bridgeless graph has a 6-flow. Here we pose a similar conjecture for undirected graphs. **Conjecture:** For any natural number $r(r \geq 3)$, every r-regular graph has a zero-sum 5-flow. (A *zero sum k-flow* of a graph G is a weight function $\phi : E(G) \to \{\pm 1, \pm 2, \ldots, \pm(k-1)\}$, such that for every vertex $v \in V(G)$ the sum of weights of all edges incidence with v is zero). Among the results, we show that our conjecture is true for any even r and $r = 3$.