



REAL FLOW NUMBER AND THE CYCLE RANK OF A GRAPH

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We establish a relationship between the real (circular) flow number of a graph and its cycle rank. We show that a connected graph with real flow number $p/q + 1$ where p and q are two relatively prime numbers must have cycle rank at least $p + q - 1$. A special case of this result yields that the real flow number of a 2-connected cubic graph with chromatic index 4 and order at most $8k + 4$ is bounded from below by $4 + 1/k$. Using this bound we prove that the real flow number of the Isaacs snark I_{2k+1} equals $4 + 1/k$, completing the upper bound due to Steffen (J. Graph Theory **36** (2001), 24–34).