

SOME TOUGHNESS RESULTS IN INDEPENDENT DOMINATION CRITICAL GRAPHS

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Abstract

A subset S of $V(G)$ is an independent dominating set of G if S is independent and each vertex of G is either in S or adjacent to some vertex of S . Let $i(G)$ denote the minimum cardinality of an independent dominating set of G . A graph G is k - i -critical if $i(G) = k$, but $i(G + uv) < k$ for any pair of non-adjacent vertices u and v of G . In this paper, we establish that if G is a connected 3- i -critical graph and S is a vertex cutset of G with $|S| \geq 3$, then $\omega(G - S) \leq \frac{1 + \sqrt{8|S| + 1}}{2}$, improving a result proved by Ao [3], where $\omega(G - S)$ denotes the number of components of $G - S$. We also provide a characterization of the connected 3- i -critical graphs G attaining the maximum number of $\omega(G - S)$ when S is a minimum cutset of size 2 or 3.

Keywords: domination critical, toughness.

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REFERENCES

- [1] N. Ananchuen and W. Ananchuen, *A characterization of independent domination critical graphs with a cutvertex*, J. Combin. Math. Combin. Comput. (to appear).
- [2] N. Ananchuen, W. Ananchuen and L. Caccetta, *A characterization of connected 3-i-critical graphs of connectivity two*, (2014) submitted.
- [3] S. Ao, *Independent Domination Critical Graphs*, Master Thesis (University of Victoria, 1994).
- [4] M. Dehmer, (Ed.), *Structural Analysis of Complex Networks* (Birkhauser, Breingsville, 2011).
- [5] T.W. Haynes, S.T. Hedetniemi and P.J. Slater (Eds), *Domination in Graphs: Advanced Topics* (Marcel Dekker, New York, 1998).
- [6] D.P. Sumner and P. Blich, *Domination critical graphs*, J. Combin. Theory Ser. B **34** (1983) 65–76.
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