

ON SELKOW'S BOUND ON THE INDEPENDENCE NUMBER OF GRAPHS

JOCHEN HARANT

AND

SAMUEL MOHR

Ilmenau University of Technology
Department of Mathematics
Ilmenau, Germany

e-mail: jochen.harant@tu-ilmenau.de
samuel.mohr@tu-ilmenau.de

Abstract

For a graph G with vertex set $V(G)$ and independence number $\alpha(G)$, Selkow [*A Probabilistic lower bound on the independence number of graphs*, *Discrete Math.* 132 (1994) 363–365] established the famous lower bound $\sum_{v \in V(G)} \frac{1}{d(v)+1} \left(1 + \max \left\{ \frac{d(v)}{d(v)+1} - \sum_{u \in N(v)} \frac{1}{d(u)+1}, 0 \right\} \right)$ on $\alpha(G)$, where $N(v)$ and $d(v) = |N(v)|$ denote the neighborhood and the degree of a vertex $v \in V(G)$, respectively. However, Selkow's original proof of this result is incorrect. We give a new probabilistic proof of Selkow's bound here.

Keywords: graph, independence number.

2010 Mathematics Subject Classification: 05C69.

REFERENCES

- [1] N. Alon and J.H. Spencer, *The Probabilistic Method* (Wiley, New York, 1992).
- [2] Y. Caro, *New Results on the Independence Number* (Technical Report, Tel-Aviv University, 1979).
- [3] S.M. Selkow, *A Probabilistic lower bound on the independence number of graphs*, *Discrete Math.* **132** (1994) 363–365.
doi:10.1016/0012-365X(93)00102-B
- [4] V.K. Wei, *A Lower Bound on the Stability Number of a Simple Graph* (Technical Memorandum, TM 81 - 11217 - 9, Bell laboratories, 1981).

Received 20 November 2017
Accepted 18 December 2017