Discussiones Mathematicae
Graph Theory 39 (2019) 183–190
doi:10.7151/dmgt.2075

Full PDF
DMGT Page

INDEPENDENCE NUMBER, CONNECTIVITY AND ALL FRACTIONAL (a, b, k)-CRITICAL GRAPHS

Yuan Yuan and Rong-Xia Hao[1]

Department of Mathematics
Beijing Jiaotong University
Beijing 100044, China

e-mail: kuailenanshi@126.com
rxhao@bjtu.edu.cn

Abstract

Let G be a graph and a, b and k be nonnegative integers with $1 \leq a \leq b$. A graph G is defined as *all fractional* (a, b, k)*-critical* if after deleting any k vertices of G, the remaining graph has all fractional $[a, b]$-factors. In this paper, we prove that if $\kappa(G) \geq \max\left\{\frac{(b+1)^2+2k}{2}, \frac{(b+1)^2\alpha(G)+4ak}{4a}\right\}$, then G is all fractional (a, b, k)-critical. If $k = 0$, we improve the result given in [Filomat 29 (2015) 757–761]. Moreover, we show that this result is best possible in some sense.

Keywords: independence number, connectivity, fractional $[a, b]$-factor, fractional (a, b, k)-critical graph, all fractional (a, b, k)-critical graph.

2010 Mathematics Subject Classification: 05C70, 05C72.

References

[1] R.P. Anstee, *Simplified existence theorems for* (g, f)*-factors*, Discrete Appl. Math. **27** (1990) 29–38.
doi:10.1016/0166-218X(90)90126-W

[2] Q. Bian and S. Zhou, *Independence number, connectivity and fractional* (g, f)*-factors in graphs*, Filomat **29** (2015) 757–761.
doi:10.2298/FIL1504757B

[3] J.R. Correa and M. Matamala, *Some remarks about factors of graphs*, J. Graph Theory **57** (2008) 265–274.
doi:10.1002/jgt.20284

[1] Corresponding author.

[4] S. Liu and J. Cai, *Toughness and existence of fractional (g, f)-factors in graphs*, Ars Combin. **93** (2009) 305–311.

[5] G. Liu and L. Zhang, *Fractional (g, f)-factors of graphs*, Acta Math. Sci. Ser. B Engl. Ed. **21** (2001) 541–545.
doi:10.1016/S0252-9602(17)30443-5

[6] H. Lu, *Simplified existence theorems on all fractional $[a, b]$-factors*, Discrete Appl. Math. **161** (2013) 2075–2078.
doi:10.1016/j.dam.2013.02.006

[7] T. Niessen, *A characterization of graphs having all (g, f)-factors*, J. Combin. Theory Ser. B **72** (1998) 152–156.
doi:10.1006/jctb.1997.1797

[8] T. Nishimura, *Independence number, connectivity, and r-factors*, J. Graph Theory **13** (1989) 63–69.
doi:10.1002/jgt.3190130109

[9] S. Zhou, *Independence number, connectivity and (a, b, k)-critical graphs*, Discrete Math. **309** (2009) 4144–4148.
doi:10.1016/j.disc.2008.12.013

[10] S. Zhou, *Some results about component factors in graphs*, RAIRO Oper. Res., accepted.
doi:10.1051/ro/2017045

[11] S. Zhou, Q. Bian and Z. Sun, *Binding numbers for all fractional (a, b, k)-critical graphs*, Filomat **28** (2014) 709–713.
doi:10.2298/FIL1404709Z

[12] S. Zhou and Z. Sun, *On all fractional (a, b, k)-critical graphs*, Acta Math. Sin. Engl. Ser. **30** (2014) 696–702.
doi:10.1007/s10114-014-2629-2

[13] S. Zhou, Z. Sun and Z. Xu, *A result on r-orthogonal factorizations in digraphs*, European J. Combin. **65** (2017) 15–23.
doi:10.1016/j.ejc.2017.05.001

[14] S. Zhou, J. Wu and T. Zhang, *The existence of $P_{\geq 3}$-factor covered graphs*, Discuss. Math. Graph Theory **37** (2017) 1055–1065.
doi:10.7151/dmgt.1974

Received 5 April 2017
Revised 5 July 2017
Accepted 5 July 2017