Discussiones Mathematicae
Graph Theory 41 (2021) 1051–1066
https://doi.org/10.7151/dmgt.2229

DISTRIBUTION OF CONTRACTIBLE EDGES AND THE STRUCTURE OF NONCONTRACTIBLE EDGES HAVING ENDVERTICES WITH LARGE DEGREE IN A 4-CONNECTED GRAPH

Shunsuke Nakamura

Department of Mathematics
Tokyo University of Science
Kagurazaka 1-3
Shinjuku-Ku, Tokyo 162-8601, Japan

e-mail: nakamura_shun@rs.tus.ac.jp

Abstract

Let G be a 4-connected graph G, and let $E_c(G)$ denote the set of 4-contractible edges of G. We prove results concerning the distribution of edges in $E_c(G)$. Roughly speaking, we show that there exists a set $\mathcal{K}_0$ and a mapping $\varphi : \mathcal{K}_0 \to E_c(G)$ such that $|\varphi^{-1}(e)| \leq 4$ for each $e \in E_c(G)$.

Keywords: 4-connected graph, contractible edge, cross free.

2010 Mathematics Subject Classification: 05C40.

References

[1] K. Ando and Y. Egawa, *Edges not contained in triangles and the distribution of contractible edges in a 4-connected graph*, Discrete Math. **308** (2008) 3449–3460. https://doi.org/10.1016/j.disc.2007.07.013

[2] K. Ando, Y. Egawa, K. Kawarabayashi and M. Kriesell, *On the number of 4-contractible edges in 4-connected graphs*, J. Combin. Theory Ser. B **99** (2009) 97–109. https://doi.org/10.1016/j.jctb.2008.04.003

[3] R. Diestel, Graph Theory, 5th Edition (Springer-Verlag, Heidelberg, 2017).

[4] K. Kotani and S. Nakamura, *The existence condition of a 4-connected graph with specified configurations*, Far East J. Appl. Math. **98** (2018) 51–71. https://doi.org/10.17654/AM098010051

Received 20 March 2018
Revised 4 February 2019
Accepted 6 May 2019