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SUPER EDGE-CONNECTIVITY AND ZEROTH-ORDER RANDIĆ INDEX[1]

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Abstract

Define the zeroth-order Randić index as $R^0(G) = \sum_{x\in V(G)} \frac{1}{\sqrt{d_G(x)}}$, where $d_G(x)$ denotes the degree of the vertex x. In this paper, we present two sufficient conditions for graphs and triangle-free graphs, respectively, to be super edge-connected in terms of the zeroth-order Randić index.

Keywords: zeroth-order Randić index, super edge-connected, degree, triangle-free graph, minimum degree.

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References

[1] D. Bauer, F.T. Boesch, C. Suffel and R. Tindell, *Connectivity extremal problems and the design of reliable probabilistic networks*, in: The Theory and Application of Graphs, G. Chartrand, Y. Alavi, D. Goldsmith, L. Lesniak Foster and D. Lick (Ed(s)), (Wiley, New York, 1981) 45–54.

[2] F. Boesch, *On unreliability polynomials and graph connectivity in reliable network synthesis*, J. Graph Theory **10** (1986) 339–352. doi:10.1002/jgt.3190100311

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[3] J.A. Bondy and U.S.R. Murty, Graph Theory with Application (Elsevier, New York, 1976).

[4] G. Chartrand, *A graph-theoretic approach to a communications problem*, SIAM J. Appl. Math. **14** (1966) 778–781.
doi:10.1137/0114065

[5] Z. Chen, G. Su and L. Volkmann, *Sufficient conditions on the zeroth-order general Randić index for maximally edge-connected graphs*, Discrete Appl. Math. **218** (2017) 64–70.
doi:10.1016/j.dam.2016.11.002

[6] P. Dankelmann, A. Hellwig and L. Volkmann, *Inverse degree and edge-connectivity*, Discrete Math. **309** (2009) 2943–2947.
doi:10.1016/j.disc.2008.06.041

[7] P. Dankelmann and L. Volkmann, *New sufficient conditions for equality of minimum degree and edge-connectivity*, Ars Combin. **40** (1995) 270–278.

[8] P. Dankelmann and L. Volkmann, *Degree sequence condition for maximally edge-connected graphs depending on the clique number*, Discrete Math. **211** (2000) 217–223.
doi:10.1016/S0012-365X(99)00279-4

[9] P. Dankelmann and L. Volkmann, *Degree sequence condition for maximally edge-connected graphs and digraphs*, J. Graph Theory **26** (1997) 27–34.
doi:10.1002/(SICI)1097-0118(199709)26:1⟨27::AID-JGT4⟩3.0.CO;2-J

[10] M.A. Fiol, *On super-edge-connected digraphs and bipartite digraphs*, J. Graph Theory **16** (1992) 545–555.
doi:10.1002/jgt.3190160603

[11] A.K. Kelmans, *Asymptotic formulas for the probability of k-connectedness of random graphs*, Theory Probab. Appl. **17** (1972) 243–254.
doi:10.1137/1117029

[12] L.B. Kier and L.H. Hall, *The nature of structure-activity relationships and their relation to molecular connectivity*, European J. Med. Chem. **12** (1977) 307–312.

[13] L.B. Klein and L.H. Hall, Molecular Connectivity in Structure Activity Analysis (Research Studies Press, Wiley, Chichester, UK, 1986).

[14] L. Lesniak, *Results on the edge-connectivity of graphs*, Discrete Math. **8** (1974) 351–354.
doi:10.1016/0012-365X(74)90154-X

[15] A. Lin, R. Luo and X. Zha, *On sharp bounds of the zeroth-order general Randić index of certain unicyclic graphs*, Appl. Math. Lett. **22** (2009) 585–589.
doi:10.1016/j.aml.2008.06.035

[16] L. Plesník and S. Znám, *On equality of edge-connectivity and minimum degree of a graph*, Arch. Math. (Brno) **25** (1989) 19–25.

[17] T. Soneoka, *Super-edge-connectivity of dense digraphs and graphs*, Discrete Appl. Math. **37/38** (1992) 511–523.
doi:10.1016/0166-218X(92)90155-4

[18] G. Su, L. Xiong, X. Su and G. Li, *Maximally edge-connected graphs and zeroth-order general Randić index for* $\alpha \leq -1$, J. Comb. Optim. **31** (2016) 182–195.
doi:10.1007/s10878-014-9728-y

[19] Y. Tian, L. Guo, J. Meng and C. Qin, *Inverse degree and super edge-connectivity*, Int. J. Comput. Math. **89** (2012) 752–759.
doi:10.1080/00207160.2012.663491

[20] P. Turán, *Eine Extremalaufgabe aus der Graphentheorie*, Mat. Fiz. Lapook **48** (1941) 436–452.

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