

REMARK ON ORDINARY AND RANDIĆ ENERGY OF GRAPHS

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Abstract. Let G be an undirected simple graph with n vertices and m edges. Denote with $|\lambda_1| \geq |\lambda_2| \geq \dots \geq |\lambda_n|$ and $|\rho_1| \geq |\rho_2| \geq \dots \geq |\rho_n|$ absolute eigenvalues and Randić eigenvalues of G arranged in non-increasing order, respectively. Upper bound of graph invariant $E(G) = \sum_{i=1}^n |\lambda_i|$, and lower and upper bounds of invariant $RE(G) = \sum_{i=1}^n |\rho_i|$ are obtained in this paper.

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REFERENCES

- [1] M. BIERNACKI, H. PIDEK, C. RYLL-NARDZEWSKI, *Sur une inégalité entre des intégrales définies*, Annales Univ. Mariae Curie-Sklodowska, A4: 1–4, 1950.
- [2] N. L. BIGGS, *Algebraic graph theory*, Cambridge: Cambridge Univ. Press, 1974.
- [3] S. B. BOZKURT, A. D. GÜNGÖR, I. GUTMAN, A. S. ÇEVİK, *Randić matrix and Randić energy*, MATCH Commun. Math. Comput. Chem., **64**: 239–250, 2010.
- [4] M. CAVERS, S. FALLAT, S. KIRKLAND, *On the normalized Laplacian energy and general Randić index R_{-1} of graphs*, Lin. Algebra Appl., **433**: 172–190, 2010.
- [5] F. R. K. CHUNG, *Spectral graph theory*, Am. Math. Soc., Providence 1977.
- [6] D. CVETKOVIĆ, M. DOOB, H. SACHS, *Spectra of graphs – Theory and application*, Academic Press, New York, 1980.
- [7] G. H. FATH-TABAR, R. ASHRAFI, *Some remarks on Laplacian eigenvalues and Laplacian energy of graphs*, Math. Commun. **5**: 443–451, 2010.
- [8] R. GRONE, R. MERRIS, *The laplacian spectrum of graph II*, SIAM J. Discrete Math., **7**: 221–229, 1994.
- [9] I. GUTMAN, *The energy of graph*, Ber. Math. Stat. Sekt. Forshungst. Graz, **103**: 1–22, 1978.
- [10] I. GUTMAN, B. FURTULA, S. BOZKURT, *On Randić energy*, Lin. Algebra Appl., **442**: 50–57, 2014.
- [11] X. LI, I. GUTMAN, *Mathematical aspects of Randić-type molecular structure descriptors*, Univ. Kragujevac, Kragujevac, 2006.
- [12] X. LI, Y. YANG, *Sharp bounds for the general Randić index*, MATCH Commun. Math. Comput. Chem., **59**: 392–419, 2008.
- [13] B. J. MCCLELLAND, *Properties of the latest roots of a matrix: the estimation of π -electron energy*, J. Chem. Phys., **54**: 640–643, 1971.
- [14] R. MERRIS, *Laplacian matrices of graphs: A survey*, Lin. Algebra Appl., 197–198: 143–176, 1994.
- [15] I. Ž. MILOVANOVIĆ, E. I. MILOVANOVIĆ, A. ZAKIĆ, *A short note on graph energy*, MATCH Commun. Math. Comput. Chem., **72**: 179–182, 2014.
- [16] D. S. MITRINOVIĆ, J. E. PEČARIĆ, A. M. FINK, *Classical and new inequalities in analysis*, Kluwer Academic Publisher, 1993.
- [17] M. RANDIĆ, *On history of the Randić index and emerging hostility toward chemical graph theory*, MATCH Commun. Math. Comput. Chem., **59**: 5–124, 2008.
- [18] P. ZUMSTEIN, *Comparison of spectral methods through the adjacency matrix and the Laplacian of a graph*, Th. Diploma, ETH Zürich, 2005.