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On the eccentric connectivity polynomial of \mathcal{F} -sum of connected graphs. (English)

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Summary: The eccentric connectivity polynomial (ECP) of a connected graph $G = (V(G), E(G))$ is described as $\xi^c G, y = \sum_{a \in V(G)} \deg_G(a) y^{ec_G(a)}$, where $ec_G(a)$ and $\deg_G(a)$ represent the eccentricity and the degree of the vertex a , respectively. The eccentric connectivity index (ECI) can also be acquired from $\xi^c(G, y)$ by taking its first derivatives at $y = 1$. The ECI has been widely used for analyzing both the boiling point and melting point for chemical compounds and medicinal drugs in QSPR/QSAR studies. As the extension of ECI, the ECP also performs a pivotal role in pharmaceutical science and chemical engineering. Graph products conveniently play an important role in many combinatorial applications, graph decompositions, pure mathematics, and applied mathematics. In this article, we work out the ECP of \mathcal{F} -sum of graphs. Moreover, we derive the explicit expressions of ECP for well-known graph products such as generalized hierarchical, cluster, and corona products of graphs. We also apply these outcomes to deduce the ECP of some classes of chemical graphs.

MSC:

05C40 Connectivity

05C31 Graph polynomials

05C76 Graph operations (line graphs, products, etc.)

Full Text: [DOI](#)

References:

- [1] Sharma, V.; Goswami, R.; Madan, A. K., Eccentric connectivity index: a novel highly discriminating topological descriptor for structure-property and structure-activity studies, *Journal of Chemical Information and Computer Sciences*, 37, 2, 273-282 (1997)
- [2] Akbari, S.; Alikhani, S.; Peng, Y.-H., Characterization of graphs using domination polynomials, *European Journal of Combinatorics*, 31, 7, 1714-1724 (2010) · [Zbl 1207.05092](#)
- [3] Akbari, S.; Csikvári, P.; Ghafari, A.; Khalashi Ghezelahmad, S.; Nahvi, M., Graphs with integer matching polynomial zeros, *Discrete Applied Mathematics*, 224, 1-8 (2017) · [Zbl 1361.05066](#)
- [4] Akbari, S.; Oboudi, M. R., On the edge cover polynomial of a graph, *European Journal of Combinatorics*, 34, 2, 297-321 (2013) · [Zbl 1254.05077](#)
- [5] Feng, B.; Zahri, M., Optimal decay rate estimates of a nonlinear viscoelastic Kirchhoff plate, *Complexity*, 2020 (2020) · [Zbl 1441.35050](#)
- [6] Imran, M.; Baig, A. Q.; Rehman, S. U.; Ali, H.; Hasni, M., Computing topological polynomials of mesh-derived networks, *Discrete Mathematics, Algorithms and Applications*, 10, 6 (2018) · [Zbl 1404.92225](#)
- [7] Kang, S.; Iqbal, Z.; Ishaq, M.; Sarfraz, R.; Aslam, A.; Nazeer, W., On eccentricity-based topological indices and polynomials of phosphorus-containing dendrimers, *Symmetry*, 10, 7, 237-246 (2018)
- [8] Ashrafi, A. R.; Jalali, M., Eccentric connectivity polynomial of an infinite family of fullerenes, *Optoelectronics and Advanced Materials—Rapid Communications*, 3, 8, 823-826 (2009)
- [9] Akhter, S.; Imran, M., The sharp bounds on general sum-connectivity index of four operations on graphs, *Journal of Inequalities and Applications*, 2016, 1, 241 (2016) · [Zbl 1346.05242](#)
- [10] Akhter, S.; Imran, M., Computing the forgotten topological index of four operations on graphs, *AKCE International Journal of Graphs and Combinatorics*, 14, 1, 70-79 (2017) · [Zbl 1372.05038](#)
- [11] De, N.; Abu Nayeem, S. M.; Pal, A., Total eccentricity index of the generalized hierarchical product of graphs, *International Journal of Applied and Computational Mathematics*, 1, 3, 503-511 (2015) · [Zbl 1392.05059](#)
- [12] Eskender, B.; Vumar, E., Eccentric connectivity index and eccentric distance sum of some graph operations, *Transactions on Combinatorics*, 2, 1, 103-111 (2013) · [Zbl 1319.05082](#)
- [13] Došlić, T.; Saheli, M., Eccentric connectivity index of composite graphs, *Utilitas Mathematica*, 95, 3-22 (2014) · [Zbl 1312.05072](#)
- [14] Došlić, T.; Hosseinzadeh, M., Eccentric connectivity polynomial of some graph operations, *Utilitas Mathematica*, 84, 297-309 (2011) · [Zbl 1228.05180](#)

- [15] Ashrafi, A. R.; Hemmasi, M., Eccentric connectivity polynomial of C_{12n+2} fullerenes, *Digest Journal of Nanomaterials and Biostructures*, 4, 3, 483-486 (2009)
- [16] Alaeiyan, M.; Asadpour, J., A new method for computing eccentric connectivity polynomial of an infinite family of linear polycene parallelogram benzenod, *Optoelectronics and Advanced Materials—Rapid Communications*, 5, 7, 761-763 (2011)
- [17] Ghorbani, M.; Hemmasi, H., Eccentric connectivity polynomial of C_{12n+4} fullerenes, *Digest Journal of Nanomaterials and Biostructures*, 4, 3, 545-547 (2009)
- [18] Ghorbani, M.; Hemmasi, M., Eccentric connectivity polynomial of C_{18n+10} fullerenes, *Bulgarian Chemical Communications*, 45, 1, 5-8 (2013)
- [19] Ghorbani, M.; Ashrafi, A. R., Eccentric connectivity polynomials of fullerenes, *Optoelectronics and Advanced Materials—Rapid Communications*, 3, 12, 1306-1308 (2009)
- [20] Ghorbani, M.; Iranmanesh, M. A., Computing eccentric connectivity polynomial of fullerenes, *Fullerenes, Nanotubes and Carbon Nanostructures*, 21, 2, 134-139 (2013)
- [21] Hasni, R.; Arif, N. E.; Alikhani, S., Eccentric connectivity polynomials of some families of dendrimers, *Journal of Computational and Theoretical Nanoscience*, 11, 2, 450-453 (2014)
- [22] Yang, H.; Imran, M.; Akhter, S.; Iqbal, Z.; Siddiqui, M. K., On distance-based topological descriptors of subdivision vertex-edge join of three graphs, *IEEE Access*, 7, 143381-143391 (2019)
- [23] Ashrafi, A. R.; Ghorbani, M.; Hossein-Zadeh, M. A., The eccentric connectivity polynomial of some graph operations, *Serdica Journal of Computing*, 5, 101-116 (2011) · [Zbl 1284.05153](#)
- [24] Barrière, L.; Dalfó, C.; Fiol, M. A.; Mitjana, M., The generalized hierarchical product of graphs, *Discrete Mathematics*, 309, 12, 3871-3881 (2009) · [Zbl 1210.05120](#)
- [25] Barrière, L.; Comellas, F.; Dalfó, C.; Fiol, M. A., The hierarchical product of graphs, *Discrete Applied Mathematics*, 157, 1, 36-48 (2009) · [Zbl 1200.05196](#)
- [26] Eliasi, M.; Iranmanesh, A., The hyper-Wiener index of the generalized hierarchical product of graphs, *Discrete Applied Mathematics*, 159, 8, 866-871 (2011) · [Zbl 1222.05222](#)
- [27] Eliasi, M.; Taeri, B., Four new sums of graphs and their Wiener indices, *Discrete Applied Mathematics*, 157, 4, 794-803 (2009) · [Zbl 1172.05318](#)
- [28] Li, S.; Wang, G., Vertex PI indices of four sums of graphs, *Discrete Applied Mathematics*, 159, 15, 1601-1607 (2011) · [Zbl 1228.05248](#)
- [29] Metsidik, M.; Zhang, W.; Duan, F., Hyper- and reverse-Wiener indices of F-sums of graphs, *Discrete Applied Mathematics*, 158, 13, 1433-1440 (2010) · [Zbl 1221.05120](#)
- [30] Došlić, T.; Graovac, A.; Ori, O., Eccentric connectivity index of hexagonal belts and chains, *MATCH Communications in Mathematical and in Computer Chemistry*, 65, 745-752 (2011) · [Zbl 1289.05117](#)

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