Some Collection of Research on Graph Energy After Covod-19 Pandemic

Rupesh. R. Atram [1], Sharad. A . Barde [2]

Abstract*:*
This survey lists some important papers on graph energies, known to the authors, published after pandemic covid-19 , and summarizes their main collective characteristics. In addition to new mathematical results, after the pandemic several noteworthy and somewhat unexpected nonmathematical applications of graph energies have been proposed. The general conclusion of our analysis is that research on graph energies is active as far as further research is concerned.also use of graph theory specially energy of the different graphs used widely in different branches of sciences ,it shows the growth in research.
Key Words*: Pandemic ,Covid-19 , Graph energies , ABC Energy,Laplacian energy*

I. Introduction :

In the present times, research on graph energies is in great expansion. Thus, according to our records, before pandemic according to Gutman and H.S.Ramane a survey paper published [22]

In 2015, 2016, 2017, and 2018, not less than 114, 121, 146, and 138 articles on graph energies have been published, more than two each week. We observed that after 2019 some important results regarding energy of graphs have been published. And in this paper we are giving this research and observing some conclusion.

References for the research based on energy of graphs published after covid-19 pandemic
Here we have been taking some important Collection of Research papers that published after pandemic,there are some chances that some important papers might be missing that was published after pandemic because we have been taking only those that are we observed as important

[1]   Yalçın, F. A. Skew ABC energy of digraphs.

[2]   Ramane, H. S., Parvathalu, B., Ashoka, K., & Pirzada, S. (2022). On families of graphs which are both adjacency equienergetic and distance equienergetic. *Indian Journal of Pure and Applied Mathematics*, 1-12.

[3]   Wan, H., Zhang, X., Zhang, Y., Zhao, X., Ying, S., & Gao, Y. (2022). Structure Evolution on Manifold for Graph Learning. *IEEE Transactions on Pattern Analysis and Machine Intelligence*.

[4]   Deng, B., Chang, C., & Das, K. C. (2023). The Sachs theorem and its application on extended adjacency matrix of graphs. *Journal of Combinatorial Optimization*, *45*(1), 1-12.

[5]   Jin, X., Deng, B., & Zhang, H. Construction for a Class of Borderenergetic Digraphs.

[6]   Mondal, S., Some, B., Pal, A., & Das, K. C. (2022). On neighborhood inverse sum indeg energy of molecular graphs. *Symmetry*, *14*(10), 2147.

[7]   OZ, M. S. (2022). Coefficients of Randic and Sombor characteristic polynomials of some graph types. *Communications Faculty of Sciences University of Ankara Series A1 Mathematics and Statistics*, *71*(3), 778-790.

[8]   Mahadevi, S., Kamath, S. S., & Shetty, D. P. (2022). Graph energy centrality: a new centrality measurement based on graph energy to analyse social networks. *International Journal of Web Engineering and Technology*, *17*(2), 144-169.

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[9] Zhao, S., & Sun, S. (2023). Identification of node centrality based on Laplacian energy of networks. *Physica A: Statistical Mechanics and its Applications*, *609*, 128353.

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[11] Rejaa, M. S., & Abu, S. M. On Sombor Index and Graph Energy.

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[13] Redzepovic, I., & Gutman, I. (2022). Comparing energy and Sombor energy–An empirical study. *MATCH Commun. Math. Comput. Chem*, *88*(1), 133-140.

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[15] Li, J., Deng, B., Jin, X., & Lv, X. (2022). Q-borderenergeticity Under the Graph Operation of Complements. *Applied and Computational Mathematics*, *11*(3), 81-86.

[16] Shi, X., Kosari, S., Talebi, A. A., Sadati, S. H., & Rashmanlou, H. (2022). Investigation of the Main Energies of Picture Fuzzy Graph and its Applications. *International Journal of Computational Intelligence Systems*, *15*(1), 1-23.

[17] Mahadevi, S., Kamath, S. S., & Shetty, D. P. (2022). Study of novel COVID-19 data using graph energy centrality: a soft computing approach. *International Journal of Medical Engineering and Informatics*, *14*(3), 282-294.

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[19] Redzepovic, I., & Gutman, I. Comparing Energy and Sombor Energy–An Empirical Study.

[20] Kaya Gök, G. (2022). Some inequalities for the graph energy of distance Laplacian matrix.

[21] Mondal, S., Barik, S., De, N., & Pal, A. (2022). A note on neighborhood first Zagreb energy and its significance as a molecular descriptor. *Chemometrics and Intelligent Laboratory Systems*, *222*, 104494.

[22] Gutman, I., & Ramane, H. (2020). Research on graph energies in 2019. *MATCH Commun. Math. Comput. Chem*, *84*(2), 277-292.

In above list we observe some different types of graph energies and concept based on graph energy come to play in this research area of graph theory some of those have been listed here as below

1. Zagreb energy

2.   Some inequalities for the graph energy of distance laplacian matrix

3. Sombor energy

4. Energies of picture fuzzy graph

5. Equienergetic graphs

6. Energy of multi-monad graph

7. Laplacian energy of network

8. Somber index and graph energy

9. Graph energy centrality

10. Skew ABC energy:

11. Adjacency energy of graph

12. Neighborhood Inverse Sum Indeg energy -

With these graph energies mentioned above for future study some new energies have been in progress

Conclusion Remark :
The purpose of the present survey paper is to listing and analyze the researches after the covid-19 pandemic in the energy of graph we have observed that even though covid-19 pandemic has affected many ways in india and one of the area that also suffer in pandemic and that is

Mathematical Education and Mathematical research. Even though plenty of research papers on graph theory, especially here considering papers on energy of graphs have been published, this shows that graph energy is a wide area of research nowadays and research scholars might be thinking about this.