Nullity Sequence in Networks and Molecular Graphs

A $n \times n$ real symmetric matrix can be coded by the $n+1$–sequences of the nullity of its k–vertex–deleted subgraphs. For an undirected connected graph, modelled by a 0–1–adjacency matrix, the nullity sequences are the signature of the graph. The Cauchy's interlacing theorem and the Jacobi–Sylvester adjugate identity determine forbidden subsequences and other admissible subsequences. In this project, the first three terms of a sequence are applied directly to predict the electrical conductivity of a molecular device, the topic of the 2016 Nobel prize award to Jean-Pierre Sauvage, Sir J. Fraser Stoddart and Bernard L. Feringa. Moreover the Sciriha and Farrugia theorem [1] and the Ghorbani discovery [2] of prototypes related to the Sciriha conjecture on nuciferous graphs [3] can be studied further.

References:

[1] I. Sciriha and A. Farrugia, No chemical graph on more than two vertices is nuciferous, ARS MATHEMATICA CONTEMPORANEA 11 (2016) 397-402

[2] E. Ghorbani, Nontrivial nuciferous graphs exist, ARS MATHEMATICA CONTEMPORANEA 11 (2016) 391-395.

[3] I. Sciriha, Molecular graphs with analogous conducting connections, The

4th biennial Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Memorial University of Newfoundland (2013).

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