Soufiane Lakhlifi
Hassan II University of Casablanca

On the spectral reconstruction problem for digraphs

The idiosyncratic polynomial of a graph G with adjacency matrix A is the characteristic polynomial of the matrix $A + y(J - A - I)$, where I is the identity matrix and J is the all-ones matrix. It follows from a theorem of Hagos [1] combined with an earlier result of Johnson and Newman [2] that the idiosyncratic polynomial of a graph is reconstructible from the multiset of the idiosyncratic polynomial of its vertex-deleted subgraphs. For a digraph G with adjacency matrix A, we define its idiosyncratic polynomial as the characteristic polynomial of the matrix $A+y(J-A-I)+zA^t$. By forbidding two fixed digraphs on three vertices as induced subdigraphs, we prove that the idiosyncratic polynomial of a digraph is reconstructible from the multiset of the idiosyncratic polynomial of its induced subdigraphs on three vertices. As an immediate consequence, the idiosyncratic polynomial of a tournament is reconstructible from the collection of its 3-cycles. Another consequence is that all the transitive orientations of a comparability graph have the same idiosyncratic polynomial.

This is joint work with Edward Bankoussou-Mabiala, Abderrahim Boussaïri, Abdelhak Chaïchaâ and Brahim Chergui.

References

[1] E.M. Hagos, *The characteristic polynomial of a graph is reconstructible from the characteristic polynomials of its vertex-deleted subgraphs and their complements*, The Electronic Journal of Combinatorics, 7(1), 2000, R12.

[2] C.R. Johnson, and M. Newman, *A note on cospectral graphs*, Journal of Combinatorial Theory B, 28(1), 1980, pp. 96–103.