

A geometrical construction of isospectral magnetic graphs

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Abstract

Analysis on graphs studies the connections between geometrical or combinatorial properties of graphs and natural operators defined on them. In this talk, I will present a new geometrical construction leading to an infinite collection of families of discrete graphs, where all the elements in each family are (finite) isospectral non-isomorphic graphs for the discrete magnetic Laplacian with normalised weights. The construction is based on the notion of (isospectral) frames which, together with the s -partition of a natural number r , define the isospectral families of graphs by contraction of distinguished vertices of the frames. The isospectral frames have high symmetry and we use a spectral preorder of graphs studied in [2,3] to control the spectral spreading of the eigenvalues under elementary perturbations of the graph like vertex contraction and vertex virtualisation.

References:

- [1] J.S. Fabila-Carrasco, F. Lledó and O. Post, *A geometric construction of isospectral magnetic graphs*, preprint 2022.
- [2] J.S. Fabila-Carrasco, F. Lledó and O. Post, *Spectral preorder and perturbations of discrete weighted graphs*, *Math. Ann.* **382** (2022) 1775–1823.
- [3] J.S. Fabila-Carrasco, F. Lledó and O. Post, *Spectral gaps and discrete magnetic Laplacians*, *Lin. Alg. Appl.* **547** (2018) 183-216.