On t-Cliques in k-Walk-Regular Graphs

C. Dalfó, M.A. Fiol, E. Garriga [1,2]

Departament de Matemàtica Aplicada IV
Universitat Politècnica de Catalunya
Barcelona, Catalonia

Abstract

A graph is walk-regular if the number of cycles of length ℓ rooted at a given vertex is a constant through all the vertices. For a walk-regular graph G with $d+1$ different eigenvalues and spectrally maximum diameter $D = d$, we study the geometry of its d-cliques, that is, the sets of vertices which are mutually at distance d. When these vertices are projected onto an eigenspace of its adjacency matrix, we show that they form a regular tetrahedron and we compute its parameters. Moreover, the results are generalized to the case of k-walk-regular graphs, a family which includes both walk-regular and distance-regular graphs, and their t-cliques or vertices at distance t from each other.

Keywords: Distance-regular graphs, k-Walk-regular graphs, Spectrum, Clique.

[1] Research supported by the Ministerio de Educación y Ciencia, Spain, and the European Regional Development Fund under projects MTM2008-06620-C03-01, and by the Catalan Research Council under project 2005SGR00256.

[2] Emails: cdalfo@ma4.upc.edu, fiol@ma4.upc.edu, egarriga@ma4.upc.edu