Publicacions més rellevants de la línia de recerca:

Teoria Espectral de Grafs. Caracterització Espectral de Grafs i Digrafs amb Alta Regularitat

Referència: Comellas, F., Fiol, M.A., Gimbert, J. and Mitjana, M. On the weak distance-regularity of Moore-type digraphs. *Linear Multilinear Algebra*, **54(4)** (2006), pp. 265–284.

Abstract: We prove that Moore digraphs, and some other classes of extremal digraphs, are weakly distance-regular in the sense that there is an invariance of the number of walks between vertices at a given distance. As weakly distance-regular digraphs, we then compute their complete spectrum from a 'small' intersection matrix. This is a very useful tool for deriving some results about their existence and/or their structural properties. For instance, we present here an alternative and unified proof of the existence results on Moore digraphs, Moore bipartite digraphs and, more generally, Moore generalized p-cycles. In addition, we show that the line digraph structure appears as a characteristic property of any Moore generalized p-cycle of diameter $D \geq 2p$.

Referència: Barrière, L., Comellas, F., Dalfó, C. and Fiol, M. A. On the spectra of hypertrees. *Linear Algebra Appl.*, **428(7)** (2008), pp. 1499–1510.

Abstract: In this paper we study the spectral properties of a family of trees characterized by two main features: they are spanning subgraphs of the hypercube, and their vertices bear a high degree of (connectedness) hierarchy. Such structures are here called binary hypertrees and they can be recursively defined as the so-called hierarchical product of several complete graphs on two vertices..

Referència: Dalfó, C., Fiol, M.A. and Garriga, E. On k-walk-regular graphs. *Electron. J. Comb.*, **16(1)** (2009), Research Paper R47, 9 p.

Abstract: Considering a connected graph G with diameter D, we say that it is k-walk-regular, for a given integer $k(0 \leq k \leq D)$, if the number of walks of length ℓ between any pair of vertices only depends on the distance between them, provided that this distance does not exceed k. Thus, for $k = 0$, this definition coincides with that of walk-regular graph, where the number of cycles of

length ℓ rooted at a given vertex is a constant through all the graph. In the other extreme, for $k = D$, we get one of the possible definitions for a graph to be distance-regular. In this paper we show some algebraic characterizations of k-walk-regularity, which are based on the so-called local spectrum and predistance polynomials of G.