Publicacions més rellevants de la línia de recerca:

Els problemes de tolerància a fallades en Teoria de Grafs

Referència: Balbuena, C., García-Vázquez, P. and Marcote, X. Sufficient conditions for λ'-optimality in graphs with girth g. *J. Graph Theory*, **52(1)** (2006), pp. 73–86.

Abstract: For an edge $e = xy$ of a graph $G = (V, E)$, let $\xi(e) = d(x) + d(y) - 2$ denote the number of edges that are adjacent to e and let $\xi(G) = \min\{\xi(e) : e \in E\}$. The parameter $\xi(e)$ is called the edge-degree of e and $\xi(G)$ is called the minimum edge-degree of G. A set of edges S is called a restricted edge-cut of G provided that $G - S$ is a disconnected graph containing no isolated vertices. If the set of restricted edge-cuts of G, say R, is non-empty, the restricted edge-connectivity of G is defined by $\lambda'(G) = \min\{S : S \in R\}$ and G is called λ'-connected. In 1988, A.-H. Esfahanian and S. L. Hakimi [Inform. Process. Lett. 27(4) (1988), 195–199] showed that each connected graph of order at least 4 except a star is λ'-connected and that $\lambda'(G) \leq \xi(G)$. A graph G is called λ'-optimal whenever $\lambda'(G) = \xi(G)$. A. Hellwig and L. Volkmann [Discrete Math. 283(1-3) (2004), 113–120] proved that a λ'-connected graph G is λ'-optimal if every pair of non-adjacent vertices of G have at least 3 common neighbors. Note that this implies every λ'-connected graph of diameter 2 is λ'-optimal.

The main results in this article relate λ'-optimality to the girth, minimum degree, and diameter of a graph as follows. Let G be a λ'-connected graph with girth g, minimum degree $\delta \geq 2$, and diameter D. Then G is λ'-optimal, if $D \leq g - 2$. Furthermore, for odd girth g if all pairs u, v of vertices at distance $d(u, v) \geq g - 1$ are such that $G[N_{(g-1)/2}(u) \cap N_{(g-1)/2}(v)]$ contains edges, then G is λ'-optimal, where $N_r(v)$ denotes the set of vertices that are at a distance r from the vertex v and $G[S]$ denotes the subgraph induced by the set S.

Referència: Balbuena, C., Cera, M., Diánez, A., García-Vázquez, P. and Marcote, X. Diameter-girth sufficient conditions for optimal extraconnectivity graphs. *Discrete Math.*, **308(16)** (2008), pp. 3526–3536.

Abstract: If G is a connected graph that contains a cut set X such that all connected components of $G - X$ have at least $r + 1$ vertices, then define $k_r(G)$ to be the cardinality of the minimum such cutset. A connected graph G is k_r-connected, if $k_r(G)$ exists. Note that $k_0(G)$ coincides with $k(G)$, the classical connectivity, and $k_0(G) \leq k_1(G) \leq \ldots$. Finally, a graph G is defined to be k_r-optimal if $k_r(G) \geq \xi_r(G)$, where $\xi_r(G)$ denotes the minimum number of edges leaving a subtree of G having order $r + 1$, that is, $\xi_r(G) = \min\{\sum_{v \in V(T)} d(v) - 2r : T \subseteq G$ is a tree of order $r + 1\}$. Note that

$\xi_1(G)$ coincides with minimum edge-degree. Let $\mathrm{Per}(G)$ denote the subgraph of G induced by its peripheral vertices, i.e., vertices having eccentricity equal to the diameter. The main results of the paper can be summarized as follows.

Let $r \geq 2$ be a positive integer, G be a k_r-connected graph with girth $g \geq r+5$, diameter D and minimum degree $\delta \geq \lceil \frac{(r+1)}{2} \rceil$. Then G is k_r-optimal, provided that one of the following conditions holds:

(1) $D \leq g-7$ and $r \geq 3$;

(2) $D = g-6, r \geq 3, g$ is odd and $\mathrm{Per}(G)$ does not contain any edge;

(3) $D \leq g-4$ and $r = 2, \delta \geq 3$;

(4) $D \leq g-4$ and $r = \delta = 2, g$ is odd;

(5) $D \leq g-5$ and $r = \delta = 2, g$ is even;

(6) $D = g-3$ and $r = 2, \delta \geq 3, g$ is even and $\mathrm{Per}(G)$ does not contain any edge.

Referència: Balbuena, C., González-Moreno, D. and Marcote, X. On the 3-restricted edge connectivity of permutation graphs. *Discrete Appl. Math.*, **157(7)** (2009), pp. 1586–1591.

Abstract: An edge cut W of a connected graph G is a k-restricted edge cut if $G-W$ is disconnected, and every component of $G-W$ has at least k vertices. The k-restricted edge connectivity is defined as the minimum cardinality over all k-restricted edge cuts. A permutation graph is obtained by taking two disjoint copies of a graph and adding a perfect matching between the two copies. The k-restricted edge connectivity of a permutation graph is upper bounded by the so called minimum k-edge degree. In this paper some sufficient conditions guaranteeing optimal k-restricted edge connectivity and super k-restricted edge connectivity for permutation graphs are presented for $k = 2, 3$.