Publicacions més rellevants de la línia de recerca:

Bifurcació de cicles límit a partir d'anells de període, a partir de punts crítics i a partir de certs gràfics monodròmics. Ús de l'invers de factor integrant.

Referència: García, I.A., Giacomini, H., Grau, M., The inverse integrating factor and the Poincaré map, *Trans. Amer. Math. Soc.*, per aparèixer.

Abstract: This work is concerned with planar real analytic differential systems with an analytic inverse integrating factor defined in a neighborhood of a regular orbit. We show that the inverse integrating factor defines an ordinary differential equation for the transition map along the orbit. When the regular orbit is a limit cycle, we can determine its associated Poincaré return map in terms of the inverse integrating factor. In particular, we show that the multiplicity of a limit cycle coincides with the vanishing multiplicity of an inverse integrating factor over it. We also apply this result to study the homoclinic loop bifurcation. We only consider homoclinic loops whose critical point is a hyperbolic saddle and whose Poincaré return map is not the identity. A local analysis of the inverse integrating factor in a neighborhood of the saddle allows us to determine the cyclicity of this polycycle in terms of the vanishing multiplicity of an inverse integrating factor over it. Our result also applies in the particular case in which the saddle of the homoclinic loop is linearizable, that is, the case in which a bound for the cyclicity of this graphic cannot be determined through an algebraic method.

Referència: Gavrilov, L., Giné, J., Grau, M., On the cyclicity of weight–homogeneous centers, *J. Differential Equations* **246** (2009), 3126–3135.

Abstract: Let W be a weight–homogeneous planar polynomial differential system with a center. We find an upper bound of the number of limit cycles which bifurcate from the period annulus of W under a generic polynomial perturbation. We apply this result to a particular family of planar polynomial systems having a nilpotent center without meromorphic first integral.

Referència: Buica, A., Gasull, A., Yang, Jiazhong, The third order Melnikov function of a quadratic center under quadratic perturbations. *J. Math. Anal. Appl.* **331** (2007), no. 1, 443–

454.

Abstract: Using the algorithm proposed by Françoise and Iliev in 1996 and 1998, respectively, the authors of this paper study the first 3 Melnikov functions for a kind of quadratic Hamiltonian system under quadratic perturbations. Through analyzing the number of zeros of the corresponding Melnikov functions, they prove that the system considered can have at most three limit cycles bifurcated from the periodic orbits.