Seminari de Geometria Algebraica 2016-2017

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http://www.ub.edu/sga/

Detecting multiple solutions to polynomial systems arising from biology

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It is widespread in biology to model the time evolution of species concentrations in reaction networks with systems of ordinary differential equations. Current models in systems biology employ polynomial dynamical systems and, as a consequence, the steady states of the model are the zeros of a system of polynomial equations. These systems depend often on unknown parameters and, further, only positive solutions have a physical meaning. Therefore, it is of interest to study the positive zeros of a family of polynomials with unknown coefficients.
An important question is to understand for which parameter values, if any, there are multiple steady states. In this talk I will present a recent result to find parameter regions for the existence of multiple steady states. The underlying idea is the computation of a Brouwer degree, and the method uses different techniques from algebraic geometry.
When possible, I will abstract the results from the biological context motivating them, and focus on the mathematical aspects.

The presented results are in collaboration with Carsten Conradi, Maya Mincheva and Carsten Wiuf (preprint arXiv:1608.03993).
