

POSITIVE SOLUTIONS TO POLYNOMIAL EQUATIONS AND BIOCHEMICAL REACTION NETWORKS

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Under the law of mass-action, the dynamics of the concentration of biochemical species over time is modelled using polynomial dynamical systems, with parameterised coefficients. The steady states, or equilibrium points, of the system are the solutions to a parameterised family of systems of polynomial equations. Because only nonnegative concentrations are meaningful in applications, one aims at finding the nonnegative solutions to these systems. Usual techniques from algebraic geometry fail and therefore new methods targeting the type of system under consideration are currently being developed. In the talk I will introduce the setting, discuss the main questions we wish to investigate, explain the limitation of current algebraic techniques and finally present some of my recent work on this topic. Some of the results I will present are joint work with Daniele Cappelletti, Meritxell Sáez and Carsten Wiuf.