L'analyse qualitative des systèmes biologiques par des méthodes algébriques et symboliques

Mots clés :
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Résumé du projet de recherche (Langue 1)

Many biological phenomena may be modeled mathematically by continuous or discrete dynamical systems. In order to understand the phenomenon described by a complex dynamical system, it is necessary to study its behaviors such as stability, bifurcations, and limit cycles qualitatively. For nonlinear dynamical systems, it is a crucial and challenging task to analyze their qualitative behaviors, and in the literature of experimental biology, this analysis is often performed by numerical simulation. The rigorous analysis of dynamical systems with exact symbolic and algebraic computation is an important problem. The task of my work is to reduce the qualitative problems for continuous and discrete biological models, such as the detection of the steady states, analysis of the stability and bifurcation conditions and the construction of limit cycles to algebraic problems, and then use algebraic methods based on triangular decomposition, Gröbner bases, discriminate varieties, quantifier elimination and real solution classification to solve these algebraic problems.