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Tropical homotopies two ways

lundi 21 octobre 2024 14:00 (45 minutes)

Polyhedral homotopies were originally introduced by Huber and Sturmfels nearly 30 years ago, and have since become a staple strategy for solving polynomial systems. Main topic of the talk is a generalisation thereof. Building on ideas of Jensen, Leykin, and Yu, we will discuss two distinct types of tropical homotopies: First, we will discuss how to use tropical points to construct homotopies for solving systems of polynomial equations. Second, we will discuss how to compute tropical points using homotopies for intersecting systems of balanced polyhedral complexes.

Centerpiece of the talk are systems of parametrized polynomial equations, and we will focus on two main cases: Vertically parametrized polynomial systems are systems in which parameters are shared between equations but always bound to the same monomial. These are for example the steady state equations of chemical reaction networks or they arise in the computation of ED or ML degrees. Horizontally parametrized polynomial systems are systems in which parameters are shared between monomials but always bound to the same equation. These are prominently studied using the theory of Khovanskii bases and Newton Okounkov bodies.

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