

Certifying solutions to overdetermined and singular polynomial systems over \mathbb{Q}

Agnes Szanto, North Carolina State University

Given an overdetermined system of polynomials with rational coefficients, we give a method to certify that there is an exact root near a given point. Our method is based on the numerical computation of the exact rational univariate representation of a component of the input system, and then alpha theory to certify the approximate solution of the rational univariate representation. We show that our iterative method is locally quadratically convergent to the exact rational univariate representation, and we discuss bounds on the number of iterations needed. In the second part of the talk, we apply the above method to certify points near an exact isolated root with higher multiplicity, as well as to certify the exact multiplicity structure at that root.

This is a joint work with Tulay Akoglu, Jonathan Hauenstein and Victor Pan.