

Department of Mathematics and Computer Science

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Master's Thesis Defense

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Complex Varieties as Minima

Abstract:

Finding sequences of points that rapidly converge to a solution of a given polynomial equation or a system of polynomial equations with complex coefficients (i.e. approximating points on complex varieties) is one of the fundamental questions in mathematics and its applications. **We will present three new methods of constructing such sequences.**

We firstly create a surface in a 3-dimensional real vector space whose minima are located exactly at the solutions of our equation. Each of these methods finds a sequence that converges to a minimum point on such a surface. Two of the methods belong to the class of gradient descent methods, and the third method uses osculating circles. One of the two gradient descent methods will be applied to solving systems of polynomial equations with complex coefficients. There will be examples, code snippets, and outputs of programs to illustrate all of these methods.