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Approximation Constants and Curves of Best Approximation of Points on Weighted Projective Surfaces

Traditionally, the study of Diophantine approximation involves measuring how well a real number may be approximated by rational numbers using a quantity called the approximation exponent. Over the nineteenth and early twentieth centuries, the approximation exponent of irrational algebraic numbers was refined by many mathematicians, and Klaus Roth (1955) determined that the approximation exponent is 2 for all irrational algebraic numbers. In 2015, David McKinnon and Mike Roth introduced approximation constants for points on algebraic varieties, thereby generalizing the idea of Diophantine approximation via approximation exponents to arbitrary varieties. Further, the approximation constant of a point may be associated to its curves of best approximation, which is a program proposed by McKinnon in 2007.

In this talk, I will present results from a joint project with David McKinnon, Rindra Razafy and Matthew Satriano computing lower bounds of approximation constants of points on a class of weighted projective surfaces. Our technique was based on estimating a related geometric invariant called the effective threshold. I will explain how our lower bounds give useful information about approximation constants of points on the respective surfaces, as well as how one may use these bounds to construct good estimates of curves of best approximation to the respective points. Finally, if I have time, I will present an example where our construction gives a curve of best approximation, as well as an example where the curve of best approximation does not match our construction.