

MASTER'S
DEFENSE

*Rank-Favorable Bounds for Rational Points on Superelliptic
Curves*

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Abstract: Let C be a curve of genus at least two, and let r be the rank of the rational points on its Jacobian. Under mild hypotheses on r , recent results by Katz, Rabinoff, Zureick-Brown, and Stoll bound the number of rational points on C by a constant that depends only on its genus. Yet one expects an even stronger bound that depends favorably on r : when r is small, there should be fewer points on C . In a 2013 paper, Stoll established such a “rank-favorable” bound for hyperelliptic curves using Chabauty’s method. In the present work we extend Stoll’s results to superelliptic curves. We also discuss a possible strategy for proving a rank-favorable bound for arbitrary curves based on the metrized complexes of Amini and Baker. Our results have stark implications for bounding the number of rational points on a curve, since r is expected to be small for “most” curves.

Monday, April 3, 2017, 3:00 pm
MSC: N304

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EMORY UNIVERSITY