# On rational approximation of square-root parameterizable curves 

Miroslav Lávička<br>Department of Mathematics \& NTIS - New Technologies for the Information Society, Faculty of Applied Sciences, University of West Bohemia, Univerzitní 8, 30614 Plzeň, Czech Republic<br>lavicka@kma.zcu.cz


#### Abstract

We study situations when non-rational parameterizations of planar or space curves as results of certain geometric operations or constructions are obtained. We focus especially on such cases in which one can identify a rational mapping which is a double cover of a rational curve. Hence, we deal with rational, elliptic or hyperelliptic curves that are birational to plane curves in the Weierstrass, cf. [1, 2] form and thus they are square-root parameterizable. We design a simple algorithm for computing an approximate (piecewise) rational parametrization using topological graphs of the Weierstrass curves. Predictable shapes reflecting a number of real roots of a univariate polynomial and a possibility to approximate easily the branches separately play a crucial role in the approximation algorithm. The designed approach is presented on several examples from planar or spatial geometry, cf. [3].


Joint work with: Michal Bizzarri, Jan Vršek.

## References

[1] M. van Hoeij. An algorithm for computing the Weierstrass normal form. In: ISSAC '95 Proceedings of the 1995 international symposium on Symbolic and algebraic computation. ISSAC '95. ACM, New York, NY, USA, pp. 90-95, 1995.
[2] M. van Hoeij. An algorithm for computing the Weierstrass normal form of hyperelliptic curves. arXiv:math/0203130, 2002.
[3] M. Bizzarri, M. Lávička and J.Vršek. Piecewise rational approximation of square-root parameterizable curves using the Weierstrass form. Computer Aided Geometric Design, 56, pp. 52-66, 2017.

