Assi, Abdallah; García-Sánchez, Pedro A.
Algorithms for curves with one place at infinity. (English) Zbl 1331.14057

In this paper the authors present three procedures which are part of the NumericalSgps GAP package (see http://cmup.fc.up.pt/cmup/mdelgado/numericalsgps/). These procedures are:

- **Semigroup of values of plane curve with single place at infinity.** Given an algebraic plane curve \( f \), it checks if \( f \) has one place at infinity; if so, it computes the generators of its semigroup of values and its approximate roots. This algorithm is based on S. S. Abhyankar [Adv. Math. 74, No. 2, 190-257 (1989; Zbl 0683.14001)] and is the main novelty of the paper.

- **Curve associated to delta sequence.** Given a \( \delta \)-sequence \( l \), it computes a curve whose semigroup of values is generated by \( l \). This algorithm corresponds with Algorithm 1 in [M. Fujimoto and M. Suzuki, Osaka J. Math. 39, No. 4, 1005–1027 (2002; Zbl 1053.14069)].

- **Delta sequences with Frobenius number.** Given a positive integer \( g \), it computes the set of all \( \delta \)-sequences generating numerical semigroups with Frobenius number \( g \).

Finally, at the end of the paper, the authors give an example of a polynomial which does not have a unique embedding in the plane and the same example provides a counterexample for the conjecture stated in [V. Shpilrain and J.-T. Yu, J. Algebra 217, No. 2, 668–678 (1999; Zbl 0964.14025)].

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**MSC:**

- 14Q05 Computational aspects of algebraic curves
- 20M14 Commutative semigroups
- 68W01 General topics in the theory of algorithms
- 14R05 Classification of affine varieties
- 14–04 Software, source code, etc. for problems pertaining to algebraic geometry

**Keywords:**

curves with one place at infinity; semigroup of values; approximate roots

**Software:**

GAP; numericalsgps

**Full Text:** DOI arXiv

**References:**

[3] Abhyankar, S. S., Algorithmic algebraic geometry, (1986), Purdue University, Lecture Notes by C. Bajaj


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