

Deciding trigonality of algebraic curves

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FRI/P3 17:00–17:20

Let C be a non-hyperelliptic algebraic curve of genus at least 3. Enriques and Babbage proved [1,2] that its canonical image is the intersection of the quadrics that contain it, except when C is trigonal (that is, it has a linear system of degree 3 and dimension 1) or C is isomorphic to a plane quintic (genus 6). We present a method to decide whether a given algebraic curve is trigonal, and in the affirmative case to compute a map from C to the projective line whose fibers cut out the linear system. It is based on the Lie algebra method presented in [3]. Our algorithm is part of a larger effort to determine whether a given algebraic curve admits a radical parametrization.

- [1] F. Enriques, *Sulle curve canoniche di genere p dello spazio a $p-1$ dimensioni*. Rend. dell'Acc. delle Scienze di Bologna 23 (1919), 80–82.
- [2] D.W. Babbage, *A note on the quadrics through a canonical curve*. J. London Math Soc. 14 (1939), 310–315.
- [3] W. A. de Graaf, M. Harrison, J. Píniková and J. Schicho, *A Lie algebra method for the parametrization of Severi-Brauer surfaces*. J. Algebra 303 (2006) no.2, 514–529.