Kolloquium

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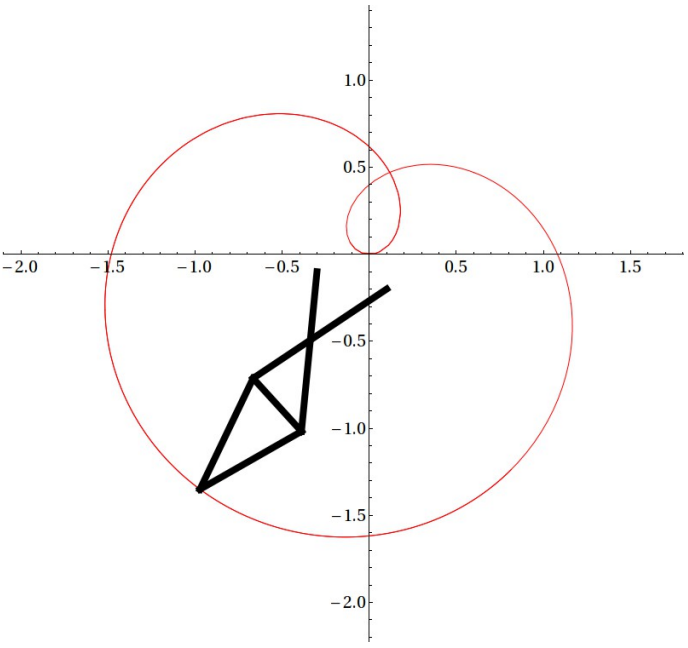
A Parametric Variant of Kempe's Universality Theorem

A planar linkage consists of a finite number of plane figures (mostly line segments and triangles), called *links*, and joints, which are common points of two or more links. Fixing one link, the other links may move in the plane, tracing out a plane curve. It is easy to prove that this curve is algebraic and that it is bounded. Kempe's Universality Theorem states that every bounded algebraic curve can be traced out by a linkage.

In the variant considered in this talk, we prescribe not only the position of the drawing link but also its orientation. Moreover, we do not trace an algebraic curve given as the zero set of an algebraic equation, but a parametrization by rational functions. This is a restriction of generality, because we deal only with curves that allow a rational parametrization, which means curves of genus zero.



Our method is based on factorization of univariate polynomials over a non-commutative ring $\mathbb{K}$, which is a subring of the algebra of dual quaternions. This algebraic structure is well suited for the description of the group of Euclidean motions in the plane.

The results are joint work with Matteo Gallet, Christoph Koutschan, Zijia Li, Georg Regensburger, and Nelly Villamizar (all from RICAM Linz).

Do·16·Okt

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