This article studies polynomial parametrisations of knots and in particular the polynomial degrees that are in some sense minimal for a given knot type.

Every knot $K$ admits a polynomial parametrisation, i.e. there is a polynomial map $\gamma : \mathbb{R} \to \mathbb{R}^3$ whose image closes to $K$ in $S^3$ by adding the point at infinity. To every such parametrisation we can associate a triple of numbers, namely the polynomial degrees of the parametrisation of the $x$-, $y$- and $z$-coordinate, respectively. The lexicographic degree of a knot $K$ is defined as the triple that is minimal among all polynomial parametrisations of $K$ with respect to the lexicographic order.

The authors use techniques from the study of plane curves and pseudoholomorphic curves to compute the lexicographic degrees of all 2-bridge knots with minimal crossing number at most 11 and find that for these knots the lexicographic degree always takes the form $(3, b, 3N - b)$ for some value $b$.

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MSC:

57K10 Knot theory
14H50 Plane and space curves
20F36 Braid groups; Artin groups
14P25 Topology of real algebraic varieties
11A55 Continued fractions

Keywords:
real pseudoholomorphic curves; polynomial knots; two-bridge knots; Chebyshev curves

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References:


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