

On families of homogeneous algebraic graphs of large girth and corresponding polynomial transformation of free modules

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Abstract

Homogeneous algebraic graphs defined over an arbitrary field are classical objects of Algebraic Geometry. Assume that the codimension of a homogeneous graph is the ratio of the dimension of variety of its vertices and the dimension of neighbourhood of some vertex. We evaluate the minimal codimension $v(g)$ of an algebraic graph of prescribed girth g . We use known constructions of families of homogeneous bipartite algebraic graphs of increasing girth defined over arbitrary integrity domain K for the constructions of families of polynomial transformations of affine varieties K^n (free modules over K), $n = 1, 2, \dots$ of polynomial degree $k = 2, 3$.

Some applications of these families of groups to Theoretical Computer Science will be discussed.