

Mordell-Weil group of isotrivial families of curves

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In this talk we discuss several results on the Mordell-Weil group of the Jacobian of certain isotrivial families of plane curves.

Let $f(x,y)$ be a reduced weighted homogeneous polynomial and let $g(s,t)$ be a polynomial. Consider the affine curve $C/\mathbb{C}(s,t)$ given by $f(x,y)+g(s,t)=0$. We will give a formula for the Mordell-Weil rank of the associated Jacobian, under a mild hypothesis.

We will use this to show that if $f \in \mathbb{C}[s,t]$ is an irreducible polynomial then the Mordell-Weil rank of the elliptic curves $y^2=x^3+f^2$, $y^2=x^3+fx$ and $y^2=x^3+Af^2x+Bf^3$ are all zero.

Finally, we will give arithmetic interpretations of various results on the topology of singular plane curves.