Department of Mathematics Seminar Talk

A geometric viewpoint of the addition on superelliptic Jacobians

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October 17, 2019, 1:00 pm
Room Γ31

Abstract

We give a geometric interpretation of the group law for Jacobians of superelliptic curves $\mathcal{X}$ by extending the geometric construction of chords and tangents on an elliptic curve to a curve $\mathcal{Y}$ which is determined explicitly in terms of the coefficients of $\mathcal{X}$. For any given superelliptic curve with affine equation $\mathcal{X}$ and reduced divisors $D_1 = \sum_{i=0}^{g} P_i - g\infty$ and $D_2 = \sum_{i=g+1}^{2g} P_i - g\infty$, the intersection $\mathcal{Y} \cap \mathcal{X}$ has precisely $3g$ points $\{P_i\}_{i=1}^{3g}$ and the divisor $-(D_1 + D_2) = \sum_{i=2g+1}^{3g}$. The method makes use of the basis of holomorphic differentials for superelliptic curves ordered according to the order at infinity.