

On (N, r) -Galois-Weierstrass numerical semigroups

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A popular problem in algebraic curves theory is the verification that a given numerical semigroup is a Weierstrass semigroup, and in this case, to determinate which curve and point this semigroup can be realized (which is equivalent to determinate a curve \mathcal{X} whose functions field $k(\mathcal{X}) = k(x, y)$ has a place $P \in \mathbb{P}_{k(x, y)}$ such that $H = H(P)$). Thus, the objective of this work is to introduce an implement to try to solve this problem. In order to do this we study curves given by

$$y^N = \prod_{i=1}^{N-1} \prod_{j=1}^{\ell_i} (x - a_{ij})^i,$$

where $N \in \mathbb{N} \setminus \{0\}$, ℓ_j 's are non-negative integers numbers such that $\gcd(N, \sum_{j=1}^{N-1} j\ell_j) = 1$ and k is a field of characteristic $\text{char}(k) = p \geq 0$ that satisfies:

1. N is relatively prime to p ;
2. if $\#k$ is the cardinality of k , so $\#k \geq \sum_{j=1}^{N-1} \ell_j$;
3. k contains the primitive N -th root of unity.