

Homma, Masaaki; Kim, Seon Jeong

Nonsingular plane filling curves of minimum degree over a finite field and their automorphism groups: Supplements to a work of Tallini. (English) [Zbl 1259.14023](#)

Linear Algebra Appl. 438, No. 3, 969-985 (2013).

Let \mathbb{F}_q be a finite field. The authors find nonsingular projective plane curves over \mathbb{F}_q , of degree $q + 2$, whose \mathbb{F}_q -rational points fill the whole projective plane $\mathbb{P}^2(\mathbb{F}_q)$. The degree $q + 2$ is minimal for a curve with this property. Let x, y, z be homogeneous coordinates of \mathbb{P}^2 , and $U = y^q z - y z^q$, $V = z^q x - z x^q$, $W = x^q y - x y^q$. The curves have equations $F_A = 0$, where $F_A = (x \ y \ z)A(U \ V \ W)^t$, for a 3×3 matrix A with entries in \mathbb{F}_q , whose characteristic polynomial is irreducible. The automorphism groups of these curves are also determined.

The results of the paper are similar to those obtained by *G. Tallini* in [Atti Accad. Naz. Lincei, VIII. Ser., Rend., Cl. Sci. Fis. Mat. Nat. 30, 706–712 (1961; [Zbl 0107.38104](#)), Rend. Mat. Appl., V. Ser. 20, 431–479 (1961; [Zbl 0106.35604](#))].

Reviewer: [Enric Nart Viñals \(Barcelona\)](#)

MSC:

- [14G15](#) Finite ground fields in algebraic geometry
- [14H37](#) Automorphisms of curves
- [14H50](#) Plane and space curves
- [14G05](#) Rational points
- [11G20](#) Curves over finite and local fields

Cited in **2** Reviews
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Keywords:

plane curve; finite field; rational point; automorphism group of a curve

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