ON UNRAMIFIED SEPARABLE ABELIAN p-EXTENSIONS OF FUNCTION FIELDS I

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1. Let k be an algebraically closed field of characteristic $p>0$. Let K/k be a function field of one variable and L/K be an unramified separable abelian extension of degree p^r over K. The galois automorphisms $\varepsilon_1, \ldots, \varepsilon_{p^r}$ of L/K are naturally extended to automorphisms $\eta(\varepsilon_1), \ldots, \eta(\varepsilon_{p^r})$[1] of the jacobian variety J_L of L/k. If we take a svstem of p-adic coordinates on J_L, we get a representation $\{M_p(\eta(\varepsilon_\nu))\}$ of the galois group $G(L/K)$ of L/K over p-adic integers.

The aim the present note is to determine the p-adic integral representation $\{M_p(\eta(\varepsilon_\nu))\}$ for cyclic L/K (as a representation over p-adic integers). Use will be made of the results in our previous paper [2].

2. Let $\{H_0, H_1, \ldots, H_s\}$ be the set of all the subgroup of $G(L/K)$ such that $G(L/K)/H_i$ $(i=0, 1, \ldots, s)$ are cyclic, where H_0 means $G(L/K)$. We denote by L_{H_i} the subfield of L corresponding to H_i.

We use the following notations:

p^{ν_i}: the degree of L_{H_i} over K,

J_{L_H}: the jacobian variety of L_H/k,

$\pi_{L'/L''}$: the trace mapping of $J_{L'}$ onto $J_{L''}$, where $L'\supset L''$,[2]

$B_{L'/L''}$: the irreducible component of $\pi_{L'/L''}^{-1}(0)$ containing $\{0\}$,

$\bar{A}_{L'/L''}$: the quotient abelian variety of $J_{L'}$ by $B_{L'/L''}$,

$\alpha_{L'/L''}$: the natural homomorphism of $J_{L'}$ onto $\bar{A}_{L'/L''}$,

$\bar{\pi}_{L'/L''}$: the homomorphism of $\bar{A}_{L'/L''}$ onto $J_{L''}$ such that $\bar{\pi}_{L'/L''}\alpha_{L'/L''}=\pi_{L'/L''}$,

$\rho_{L'/L''}$: the cotrace mapping of $J_{L''}$ into $J_{L'}$,

$\bar{B}_{L'/L''}$: the quotient abelian variety of $J_{L'}$ by $\rho_{L'/L''}(J_{L''})$,

$A(n)$: the group consisting of all points t on A such that $nt=0$, where A is an abelian variety.

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1) 2) See 1.2 in [2].