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Class Field Theory of p-Extensions over a Formal Power Series Field with a p-Quasifinite Coefficient Field

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Introduction

Local class field theory has been generalized by M. Moriya and T. Nakayama [4, 5] for the case where the ground field K is a complete local field (i.e., a complete field under a discrete valuation) with a quasi-finite residue field C. Here a field C is called quasifinite if C satisfies the following two conditions;

1. C is a perfect field.
2. $\mathrm{Gal}(C_s/C)\cong\hat{\boldsymbol{Z}}$,

where C_s is the separable algebraic closure of C and $\hat{\boldsymbol{Z}}=\mathrm{proj.\,lim}\,\boldsymbol{Z}/n\boldsymbol{Z}$. Thereafter, G. Whaples [7, 8] proved explicitly the existence theorem over a complete local field K with a quasifinite residue field of characteristic $p>0$, introducing the notion of analytic subgroups of the multiplicative group $K^\times$ of K. J. P. Serre [6] reconstructed class field theory over such a field K by using the class formation theory which was introduced by E. Artin. But the existence theorem was discussed only in the case where the residue field of the ground field is finite.

On the other hand, Y. Kawada and I. Satake [2] applied the residue vectors defined in E. Witt [9] to the class formation theory of p-extensions over a formal power series field in one variable with a finite coefficient field of characteristic $p>0$. Thereafter, K. Kanesaka and K. Sekiguchi [3] carried out explicitly the calculation of the residue vectors of the formal power series field with a perfect coefficient field of characteristic $p>0$.

In this paper we consider the generalized local class field theory by the method of Y. Kawada and I. Satake [2] using the explicit calculation of the residue vectors. Since we consider only p-extensions, the condition of the residue field to be quasifinite can be replaced by a weaker condition to be p-quasifinite (see Definition 1.2.1). Namely, we shall prove

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