182. *Finite Automorphism Groups of Restricted Formal Power Series Rings*

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1. A formal power series $f=\sum_{i=0}^{\infty} a_iX^i$ with coefficients in a linearly topological ring A is called a restricted formal power series if the sequence of its coefficients $\{a_i\}$ converges to 0. All of such formal power series forms a subring of the formal power series ring $A[[X]]$, which is called a restricted formal power series ring and denoted by $A\{X\}$.

In [5], Samuel has obtained the following result:

Let A be a Noetherian complete local integral domain, and G a finite group consisting of A-automorphisms of $A[[X]]$. Then there exists a formal power series f such that the G-invariant subring of $A[[X]]$ is $A[[f]]$.

This is a generalization of the result of Lubin [2] which dealt with the case where A is the ring of $\mathfrak{p}$-adic integers and G is given by using a formal group law.

The main purpose of this paper is to prove the following:

Theorem. *Let A be a Noetherian complete integral domain with the maximal ideal $\mathfrak{m}$, and G a finite group consisting of A-automorphisms of $A\{X\}$. If the residue class field $A/\mathfrak{m}$ is perfect, there exists a series $f\in A\{X\}$ such that the G-invariant subring $A\{X\}^G$ of $A\{X\}$ is $A\{f\}$.*

2. At first, we shall show some results concerning $A\{X\}$.

Lemma 1. *Let A be a linearly topological ring whose topology is complete and T_0. Then, $A\{X+a\}=A\{X\}$ for any $a\in A$.*

Proof. For any $f=\sum_{i=0}^{\infty} a_i(X+a)^i\in A\{X+a\}$, we have $f=\sum_{i=0}^{\infty} b_iX^i$ in $A[[X]]$, where $\{b_i\}$ converges to 0. Hence, $f\in A\{X\}$.

If $\mathfrak{a}$ is an ideal of A, by $\mathfrak{a}\{X\}$ we denote the ideal of $A\{X\}$ consisting of all series $\sum_{i=0}^{\infty} a_iX^i$, $a_i\in\mathfrak{a}$.

Lemma 2. *Let A be a linearly topological ring whose topology is complete and T_0. Let $\mathfrak{m}$ be a closed ideal of A such that every $m\in\mathfrak{m}$ is topologically nilpotent. If $f\in A\{X\}$ is a series such that $\bar{f}=f$ mod $\mathfrak{m}\{X\}$ is a unitary polynomial with the degree $s\geqq 1$, then $A\{X\}$ is the*