Yurij Leshchenko (Bogdan Khmelnitsky National University of Cherkasy, Cherkasy, Ukraine)

Infinitely Iterated Wreath Product of Elementary Abelian Groups

The construction of n-iterated wreath products of cyclic groups of prime order p were used in the study of Sylow subgroups of finite symmetric groups by L. Kaloujnine in the end of 40's (of XX century). In the article [1] author applied the *tabular* representation of wreath products and the concept of the *weighted degree* of polynomials to assign the class of so called "*parallelotopic*" subgroups. Using this notation the class of characteristic subgroups, lower and upper central series of a finitely iterated wreath product were described. Then, in the early 70's V. Sushchanskij (see, [2]) used a similar (but improved) technique to generalize results of L. Kaloujnine for the case of finitely iterated wreath product of elementary abelian groups.

On the other hand, in the paper [3] by I. Ivanuta, which is denoted to the study of Sylow structure of the finitary symmetric group, naturally arises a construction of generalized (*infinitely iterated*) wreath product of cyclic groups of prime order. Such generalizations are also can be found in the study of other inductive limits of finite symmetric groups.

We consider another infinitely iterated (we called it *left-truncated*) wreath product of elementary Abelian groups of rank n. A similar wreath product construction naturally arises as a Sylow subgroup of the inductive limit of finite symmetric groups with strictly diagonal embeddings.

Let F_p^n be an elementary Abelian p-group of rank n, considered as an additive group of n-dimensional vector space over a finite field F_p ($|F_p| = p$, p is a prime and $p \neq 2$). Let $U_{p,n}^{\infty}$ be the group of infinite almost zero sequences (or *tableaux*)

$$u = [\overline{a}_1(\overline{v}_2, \ldots, \overline{v}_k), \ldots, \overline{a}_m(\overline{v}_{m+1}, \ldots, \overline{v}_k), \overline{0}, \overline{0}, \ldots], \quad k > m \quad (k, m \in N), \tag{1}$$

where $\overline{a}_j(\overline{v}_{j+1}, \ldots, \overline{v}_k)$ is a map from $F_p^n \times \ldots \times F_p^n$ ($k - j$ factors) into F_p^n, $\overline{0}$ is a zero-vector. The action of $U_{p,n}^{\infty}$ on the Cartesian product $\prod_{i=1}^{\infty} F_p^n$ is defined by the rule:

$$(\overline{v}_1, \ldots, \overline{v}_m, \ldots)^u = (\overline{v}_1 + \overline{a}_1(\overline{v}_2, \ldots, \overline{v}_k), \ldots, \overline{v}_m + \overline{a}_m(\overline{v}_{m+1}, \ldots, \overline{v}_k), \ldots), \tag{2}$$

where $(\overline{v}_1, \ldots, \overline{v}_m, \ldots) \in \prod_{i=1}^{\infty} F_p^n$ and u is a tableau (1). One can show, that elements of $U_{p,n}^{\infty}$ can be expressed as infinite ($n \times \infty$) almost zero tableaux of reduced (with degree at most $p-1$ in each variable) polynomials over F_p. Using an idea of the weighted degree of polynomials (which differs from those that were introduced in [1, 2]) and notion of parallelotopic subgroups the criterion for characteristic subgroups of $U_{p,n}^{\infty}$ is obtained.

[1] Kaloujnine L. // Ann. Sci. l'Ecole Norm. Super. — 1948. — **65**.

[2] Sushchansky V. // Mathematical Notes. — 1972. — **11**, N 1.

[3] Ivanuta I. // Ukrain. Mat. Zh. — 1963. — **15**, N 3.