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Representations of finite p-groups over commutative rings

Let K be an integral domain of characteristic zero, which is not a field. A finite group G is called wild over the ring K, if the description of non-equivalent matrix K-representations of the group G includes the problem of the classification up to similarity of pairs of $n \times n$-matrices over some field for an arbitrary natural n.

The problem of the wildness of a finite p-group over the ring K have been solved [1–4], if K is a complete discrete valuation ring or K is the ring of formal power series in m indeterminate with coefficients from complete discrete valuation ring.

We have obtain the next results.

Theorem 1. *Let G be a finite p-group of order $|G|$ and K ba an integral domain of characteristic zero, K^* be the multiplicative group of the ring K and $p \notin K^*$. The group G is wild over the ring K if one of the following conditions holds:*

1) *G is a non-cyclic p-group and $p \neq 2$;*
2) *G is the cyclic p-group of order $|G| = p^r$ $(r > 2,\ p \neq 2)$;*
3) *G is a non-cyclic 2-group of order $|G| > 4$;*
4) *G is the cyclic 2-group of order $|G| > 8$;*
5) *G is a non-cyclic 2-group of order 4 or the cyclic 2-group of order $|G| > 4$ and K is a local ring with residue class field of characteristic 2, $\operatorname{Rad} K \neq 2K$ ($\operatorname{Rad} K$ is the Jacobson radical of the ring K);*
6) *G is the cyclic p-group of order p^2 and K is a local factorial ring, which is not a discrete valuation ring.*

It is received also a number of results about degrees of indecomposable matrix representations of finite p-groups over integral domains.

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