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Structure of the subgroup of permutations spanned by the Dickson and the Linear polynomials.

We show that for some small prime number p , the group generated by invertible Dickson and linear polynomials over the finite field of p elements is the whole symmetric group over Z_p , and consequently any permutation of Z_p can be described explicitly in terms of composition of these polynomials. For a general prime number p , we study the properties of this group and the properties of the cycles of the permutations generated by Dickson polynomials. We show that the answer to the question, if the group generated by invertible Dickson and linear polynomials over the finite field Z_p is the whole symmetric group over Z_p , is indeed a non-trivial problem, particularly in terms of computational point of view. (Received August 29, 2006)