

ABELIAN GROUP CODES

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Let F be a finite field and n , a non negative integer. A linear code C of length n is a subspace of F^n . A (left) group code of length n is a linear code which is the image of a (left) ideal of a group algebra via an isomorphism $FG \rightarrow F^n$ for any G , a finite group with $|G| = n$. In this case C , is a (left) G -code. In [1], Bernal, del Río and Simón obtain a criterion to decide when a linear code is a group code in terms of the group of permutation automorphisms of C , $PAut(C)$. Sabin and Lomonaco, in [4], have proved that if C a G -code with G a semidirect product of cyclic groups, then C is an abelian group code. As an application of criterion and extending the result of Sabin and Lomonaco, in [1], they provide a family of groups for which every two-sided group code is an abelian group code. Pillado, González, Martínez, Markov e Nechaev describe some classes of groups and fields for which all group codes are abelian in [2]. Motivated by [3], they have shown that there exist a non-Abelian G -code over F . In order to extend the result on groups with abelian decomposition, we explore some conditions to determine a group G which can be written as a product of abelian subgroups, such that the G -codes with $G \in \mathcal{G}$ will be abelian group code.

[1] J. J. BERNAL, Á. DEL RÍO AND J.J. SIMÓN, AN INTRINSICAL DESCRIPTION OF GROUP OF CODES, *Des. Codes Cryptogr.* **51**(3) 289-300 (2009).

[2] C. GARCÍA PILLADO, S. GONZÁLEZ, C. MARTÍNEZ, V. MARKOV AND A. NECHAEV, GROUP CODES OVER NON-ABELIAN GROUPS, *J. Algebra Appl.* **12** (7) (2013).

[3] C. GARCÍA PILLADO, S. GONZÁLEZ, C. MARTÍNEZ, V. MARKOV AND A. NECHAEV, WHEN ALL GROUP CODES OF A NONCOMMUTATIVE GROUP ARE GROUPS ABELIAN (A COMPUTATIONAL APPROACH)?, *J. Math. Sci.* **186**(5) 578-585 (2012).

[4] R.E. SABIN AND S.J. LOMONACO, *Metacyclic Error-Correcting Codes*, AAECC, 6, 191-210 (1995).
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