

Bierbrauer, Jürgen

Nordstrom-Robinson code and A_7 -geometry. (English) Zbl 1134.94014

Finite Fields Appl. 13, No. 1, 158-170 (2007).

The Nordstrom-Robinson code by *A. W. Nordstrom* and *J. P. Robinson* [*Inf. Control* 11, 613–616 (1967; [Zbl 0157.26003](#))] is a nonlinear $(16, 2^8, 6)$ -code over \mathbb{F}_2 . A simple construction for the Nordstrom-Robinson code is given by *G. D. Forney jun.*, *N. J. A. Sloane* and *M.D. Trott* [*Coding and quantization. DIMACS/IEEE workshop held at the Princeton University, NJ, USA, October 19-21, 1992. Providence, RI: American Mathematical Society. DIMACS, Ser. Discrete Math. Theor. Comput. Sci.* 14, 19–26 (1993; [Zbl 0804.94021](#))]. The Nordstrom-Robinson code admits a huge automorphism group of order $|M_{24}|/(759 \cdot 8)$. This automorphism group is a semidirect product of an elementary abelian group of order 16 and the alternating group A_7 . In this paper the sporadic A_7 -geometry is constructed from all possible Fano planes on a set of seven elements. From this construction an elementary abelian group V of order 16 and the semidirect product $G = VA$, where $A \cong A_7$, is obtained. In the last part the author derives the Nordstrom-Robinson code from the construction of the geometry A_7 and proves that the group G is the full automorphism group of the Nordstrom-Robinson code.

Reviewer: [Kristina Altmann \(Darmstadt\)](#)

MSC:

[94B60](#) Other types of codes

[51E22](#) Linear codes and caps in Galois spaces

Cited in **3** Documents

Keywords:

[Nordstrom-Robinson](#); [\$A_7\$ -geometry](#); [diagram-geometries](#)

Full Text: [DOI](#)

References:

- [1] E.R. Berlekamp (Ed), *Key Papers in the Development of Coding Theory*, IEEE Press, New York, 1974. · [Zbl 0910.94001](#)
- [2] Bierbrauer, J., An infinite family of 7-designs, *Discrete math.*, 240, 1-11, (2001) · [Zbl 0983.05014](#)
- [3] Cameron, P.J.; van Lint, J.H., *Designs, graphs, codes and their links*, (1991), Cambridge University Press Cambridge · [Zbl 0743.05004](#)
- [4] Cayley, A., On the triadic arrangements of seven and fifteen things, *London, Edinburgh and Dublin philos. mag. J. sci.*, 37, 50-53, (1850)
- [5] Goethals, J.M., On the golay perfect binary code, *J. combin. theory*, 11, 178-186, (1971) · [Zbl 0174.50801](#)
- [6] Hammons, A.R.; Kumar, P.V.; Calderbank, A.R.; Sloane, N.J.A.; Solé, P., The \mathbb{Z}_4 -linearity of kerdock, preparata, goethals and related codes, *IEEE trans. inform. theory*, 40, 301-319, (1994) · [Zbl 0811.94039](#)
- [7] Neumaier, A., Some sporadic geometries related to $\text{PG}(3, 2)$, *Arch. math.*, 42, 89-96, (1984) · [Zbl 0509.05026](#)
- [8] Nordstrom, A.W.; Robinson, J.P., An optimum nonlinear code, *Inform. control*, 11, 613-616, (1967) · [Zbl 0157.26003](#)
- [9] Pasini, A.; Yoshiara, S., Generalized towers of flag-transitive circular extensions of a non-classical SC_3 -geometry, *J. combin. theory A*, 66, 313-320, (1994) · [Zbl 0805.51006](#)
- [10] Wan, Z.X., *Quaternary codes*, (1997), World Scientific Singapore · [Zbl 0890.94034](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.