**Abstract**

# On Transitive Codes



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Transitive objects have a lot of symmetries and play an important role in coding theory, in design theory, graph theory and group theory. Transitive codes are close to linear codes by some of their properties and therefore it is one of the reasons why it is important to investigate them and why the number of nonequivalent such codes with given parameters is not usually big. But very often for an optimal binary code one can find a transitive code with the same parameters. For example the binary image of any additive code under the Gray map is a transitive code.

Let $\mathbb{F}_2^n$ be the set of all binary vectors of length $n$. The *automorphism group* $\mathrm{Aut}(C)$ of any code $C$ of length $n$ we define as a group of all the isometries of $\mathbb{F}_2^n$ that transform the code into itself, i.e., $\mathrm{Aut}(C) = \{(v, \pi) \mid v + \pi(C) = C\}$. A code $C$ from $\mathbb{F}_2^n$ is said to be *transitive* if its automorphism group acts transitively on all codewords.

In the talk we discuss the methods to construct transitive binary codes. Applying some well-known constructions (Vasil'ev, Plotkin, Mollard), see [1], to known binary transitive codes of some lengths and using some additional conditions it is possible to get infinite classes of transitive binary codes of greater lengths. The constructions can be applied to get nonequivalent codes of length $n$ with parameters of Reed-Muller codes, and also perfect and extended perfect transitive codes with different ranks. The approaches allow to construct transitive partitions into codes, see [2]. Potapov [3] established that the generalized Phelps construction can be used to get an exponential class of nonequivalent transitive extended perfect codes of small ranks.


## References


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3. *Potapov V. N.* "On lower bound on the number of transitive perfect codes." Discrete analysis and operation research. Ser. 1. **13** (4) (2000) 49–59 (in Russian).