

Bierbrauer, Jürgen

An infinite family of 7-designs. (English) [Zbl 0983.05014](#)

Discrete Math. 240, No. 1-3, 1-11 (2001).

The author studies designs invariant under the affine group $G = E \cdot L$ over the field with two elements in its 3-transitive action on the 2^n points of the underlying vector space $V = F_2^n$. Here E is an elementary abelian group of order 2^n and L is the n -dimensional general linear group $GL_n(2)$. *W. O. Alltop* [5-designs in affine spaces, *Pac. J. Math.* 39, 547-551 (1971; [Zbl 0239.05012](#))] was the first to use this group to construct t -designs with $t > 3$. As G is 3-transitive, for every cardinality k , every orbit of G on k -subsets of the point set is a 3-design. Alltop used single orbits, proving that such an orbit is a 5-design if and only if it is a 4-design and producing an explicit example of a 5-design with $k = 24$ in case $n = 8$. Here the author studies the situation in more detail in order to construct infinite families of non-simple t -designs whose blocks are unions of G . He restricts his attention to block sizes at most 8. The main result is a family $7-(2^n, 8, 45)$, $n \geq 6$, of non-simple designs. He also obtains designs $5-(2^n, 6, 3)$ for every $n \geq 3$ and $5-(2^n, 7, 7(2^n - 16)/2)$ for every even $n \geq 6$.

Reviewer: [Peter B. Gibbons \(Auckland\)](#)

MSC:

[05B05](#) Combinatorial aspects of block designs

Cited in **2** Documents

Keywords:

non-simple t -designs

Full Text: [DOI](#)