The geometry of diagonal groups.

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Abstract

Diagonal groups are one of the classes of finite primitive permutation groups occurring in the conclusion of the O'Nan-Scott theorem. Several of the other classes have been described as the automorphism groups of geometric or combinatorial structures such as affine spaces or Cartesian decompositions, but such structures for diagonal groups have not been studied. The main purpose of this paper is to describe and characterise such structures, which we call diagonal semilattices. Unlike the diagonal groups in the O'Nan-Scott theorem, which are defined over finite characteristically simple groups, our construction works over any group, finite or infinite. A diagonal semilattice depends on a dimension m and a group T. For m=2, it is a Latin square, the Cayley table of T, though in fact any Latin square satisfies our axioms. However, for m>=3, the group T emerges naturally and uniquely from the axioms.

This is a joint work with Rosemary Bailey, Peter Cameron and Cheryl Praeger.

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