Abstract

Translation planes of order 32 with non-trivial translation complement

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Classifying translation planes is known to be equivalent to classifying spreads of subspaces in the appropriate projective spaces. Translation planes of order 32 correspond to spreads of 4-dimensiaonal subspaces in $PG(9,2)$. Two spreads yield non-isomorphic planes if and only if they are equivalent under $P\Gamma L(10,2)$.

We describe an exhaustive search for spreads of 4-spaces in $PG(10,2)$ which have a non-trivial stabilizer group under $P\Gamma L(10,2)$. Both the search among the 109221651 4-spaces and isomorph rejection are difficult and time-consuming. We conclude that there are exactly 9 translation planes of order 32 with a non-trivial translation complement and give some of their properties including group sizes and 2-ranks. The algorithms are of independent interest and can be used to generate a number of different combinatorial configurations.