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New Large Sets of t-Designs

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Abstract We introduce generalizations of earlier direct methods for constructing large sets of t-designs. These are based on assembling systematically orbits of t-homogeneous permutation groups in their induced actions on k-subsets. By means of these techniques and the known recursive methods we construct an extensive number of new large sets, including new infinite families. In particular, a new series of $LS[3](2(2+m),\ 6\cdot 3^m-2,\ 16\cdot 3^m-2$ is obtained. This also provides the smallest known v for a $t-(v,k,\lambda)$ design when $t \geq 16$. We present our results compactly for $v \leq 61$, in tables derived from Pascal's triangle modulo appropriate primes.