2 英訳文

We to study characterizations of the existence and non-existence of "good point arrangements" for sets with mathematical structures. There are two main results. First,

1. We study 3-dimensional digital nets over $\mathbb{F}_2$ generated by matrices (I, B, B^2) where I is the identity matrix and B is a square matrix. We give a characterization of B for which the t-value of the digital net is 0. As a corollary, we prove that such B satisfies $B^3 = I$. If B is maximally periodic (i.e., M-sequence), then the digital net generated by the point sequence $(a_0, a_1, a_2), (a_3, a_4, a_5), \ldots$ of linear asymptotic equation $a_{n+1} = Ba_n$ equals The digital net generated by (I, B, B^2). In other words, this result also states that the t-value of the point sequence generated by a linear asymptotic formula that is an M-sequence will not be 0.
2. We gave a construction of a pre-difference set in $G = NA$ with A an abelian subgroup and N a subgroup satisfying $N \cap A = \{e\}$, from a difference set in $N \times A$. This gives a $(16, 6, 2)$ pre-difference set in D_{16} and a $(27, 13, 6)$ pre-difference set in $UT(3, 3)$, where no non-trivial difference sets exist. We also give a product construction of pre-difference sets similar to Kesava Menon construction, which provides infinite series of pre-difference sets that are not difference sets. We show some necessary conditions for the existence of a pre-difference set in a group with index 2 subgroup. For the proofs, we use a rather simple framework "relation partitions", which is obtained by dropping an axiom from association schemes. Most results are proved in that frame work.