DISSERTATION
DEFENSE

On Pisier type problems

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Abstract: A subset A of integers is *free* if for every two distinct subsets $B, B' \subset A$ we have

$$\sum_{b \in B} b \neq \sum_{b' \in B'} b'.$$

Pisier asked if, for every subset A of integers, the following two statements are equivalent:

(1) A is a union of finitely many free sets.
(2) There exists $\epsilon > 0$ such that every finite subset $B \subset A$ contains a free subset $C \subset B$ with $|C| \geq \epsilon|B|$.

In a more general framework, the Pisier question can be seen as the problem of determining if statements (1) and (2) are equivalent for subsets of a given structure with the prescribed property. We study the problem for several structures including B_h-sets, arithmetic progressions, independent sets in hypergraphs, and configurations in the euclidean space.

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