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Sidon sets for linear forms

Let $\varphi(x_1, \ldots, x_h) = c_1x_1 + \cdots + c_hx_h$ be a linear form with coefficients in a field $\mathbf{F}$ and let V be a vector space over $\mathbf{F}$. A nonempty subset A of V is a *φ-Sidon set* if $\varphi(a_1, \ldots, a_h) = \varphi(a'_1, \ldots, a'_h)$ implies $(a_1, \ldots, a_h) = (a'_1, \ldots, a'_h)$ for all h-tuples $(a_1, \ldots, a_h) \in A^h$ and $(a'_1, \ldots, a'_h) \in A^h$. There exist infinite Sidon sets for the linear form φ if and only if the set of coefficients of φ has distinct subset sums. In a normed vector space with φ-Sidon sets, every infinite sequence of vectors is asymptotic to a φ-Sidon set of vectors. Results on p-adic perturbations of φ-Sidon sets of integers and bounds on the growth of φ-Sidon sets of integers are also obtained.