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On two-dimensional Dirichlet spectrum

One-dimensional Dirichlet spectrum $\mathbb{D}$ is defined as follows:

$$
\mathbb{D} = \left\{ \lambda \in \mathbb{R} \mid \exists v \in \mathbb{R} : \limsup_{t \to \infty} t \cdot \min_{1 \leq q \leq t} \|qv\| = \lambda \right\}.
$$

The structure of one-dimensional Dirichlet spectrum was studied by many mathematicians. In particular $\mathbb{D} \subset [1/2+1/2\sqrt{5}, 1]$ and there exists “discrete part of the spectrum”. Moreover it is known that for a certain $d^*$ one has $[d^*, 1] \subset \mathbb{D}$.

We consider $s$-dimensional Dirichlet spectrum with respect to Euclidean norm.

$$
\mathbb{D}_s = \left\{ \lambda \in \mathbb{R} \mid \exists v \in \mathbb{R}^s : \limsup_{t \to \infty} t \cdot \min_{1 \leq q \leq t} \left( \sum_{i=1}^{s} \|qv_i\|^2 \right)^{s/2} = \lambda \right\}.
$$

Multidimensional spectrum has rather different properties.

We prove that $\mathbb{D}_2 = \left[ 0, \frac{2}{\sqrt{3}} \right]$. 