

**ASYMPTOTIC BEHAVIOUR OF CUBOIDS MINIMISING
DIRICHLET EIGENVALUES.**

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We consider the shape optimisation of the Dirichlet eigenvalues of the Laplacian λ_k , $k \in \mathbb{N}$. In a collection of open sets in \mathbb{R}^m , $m \geq 2$, of prescribed measure, the focus is on determining a set which minimises the k -th Dirichlet eigenvalue. It is interesting to investigate the asymptotic behaviour of a sequence of such minimising sets as $k \rightarrow \infty$.

It was shown by Antunes and Freitas in 2012 that among planar rectangles of unit area, any sequence of minimising rectangles for the Dirichlet eigenvalues converges to the unit square as $k \rightarrow \infty$. The corresponding result for $m = 3$ was obtained in 2016 by van den Berg and Gittins. Some of the arguments used in these lower-dimensional cases cannot be invoked when $m \geq 4$.

For $m \geq 4$, we consider the collection of all unit-measure cuboids in \mathbb{R}^m , that is sets of the form $\prod_{i=1}^m (0, a_i)$. We prove that any sequence of such cuboids $(R_k^*)_k$ that minimise the Dirichlet eigenvalues converges to the unit cube as $k \rightarrow \infty$.

This is joint work with Simon Larson (KTH).