On the structure of a class of spherical designs

by

Peter Boyvalenkov
Institute of Mathematics, Bulgarian Academy of Sciences, G. Bonchev 8, 1113 Sofia, Bulgaria
Coauthors: Maya Stoyanova, Department of Mathematics and Informatics, Sofia University, J. Baucher 5, Sofia, Bulgaria

A spherical τ-design is a finite subset of the unit sphere S^{n-1} such that for every polynomial $f(x_1, x_2, \ldots, x_n)$ of degree at most τ, the average of f over the sphere equals the average of f over the design. We investigate the structure of $(2k)$-designs of cardinality of order n^{k-1} in the asymptotic process when the strength $\tau = 2k$ is fixed and the dimension n tends to infinity. We prove that, for certain constant $\gamma > 1$, all designs of cardinality at most γn^{k-1} have structure which resembles the structure of the designs of minimal possible cardinality. Our approach uses connections between $(2k)$-designs and antipodal $(2k+1)$-designs.

Date received: May 15, 2003