THE DEPARTMENT OF MATHEMATICAL SCIENCES

Indiana University - Purdue University Fort Wayne

is pleased to present

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On Bounds for Antipodal Spherical Codes

Abstract

We are interested in antipodal spherical codes $C \subset \mathbb{S}^{n-1}$ with a few possible distances which have maximal possible size M. We will first review bounds for codes with only inner products $\pm s$ (so-called equiangular lines). Then we will develop specific bounds for codes with inner products $\{0, \pm s\}$, and with $\{\pm s_1, \pm s_2\}$, as generalizations of the relative bound for equiangular lines and in the special case of spherical designs of good strength.

For example, we obtain:

Theorem. If $C \subset \mathbb{S}^{n-1}$ is an antipodal spherical 3-design with inner products in $\{-1, 0, \pm s\}$, $k \geq 2$ and $P_{2k}^{(n)}(s) + (ns^2-1)P_{2k}^{(n)}(0) < 0$, then

$$M \leq \frac{n\left(2ns + (1-2s^2)P_{2k}^{(n)}(0) - P_{2k}^{(n)}(s)\right)}{\left|P_{2k}^{(n)}(s) + (ns^2-1)P_{2k}^{(n)}(0)\right|}.$$

Here $P_i^{(n)}(t)$ are Gegenbauer polynomials, corresponding to $\mathbb{S}^{n-1}$.

Joint work with K. Delchev.

Noon – 1:00, Wednesday, May 10, 2017. Location: Kettler 216

http://ipfw.edu/departments/coas/depts/math/news/seminars.html