

## Four point symbolic semidefinite programming bounds for equiangular lines

Wei-Hsuan Yu

National Central University

u690604@gmail.com;whyu@math.ncu.edu.tw

### Abstract

A set of lines in  $R^n$  passing through the origin is called equiangular if any two lines of them form the same angle. Searching the maximum size of equiangular lines in  $R^n$  is one of the classical problems in discrete geometry. We offer the alternative semidefinite programming formula for spherical codes in contrast to Bachoc-Vallentin. The alternative formula would be simpler for implementation. Furthermore, we use the four point semidefinite programming method symbolically to improve the upper bounds on the size of equiangular lines in  $R^n$ . Our results improve the bounds for infinitely many dimensions.