Hermitean matrices of roots of unity and their characteristic polynomials

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Abstract

Hermitean matrices whose entries are roots of unity are routinely used in the study of equiangular line systems. In the real case, it was shown that the coefficients of the characteristic polynomial of such matrices are restricted. This result was fundamental to some recent improvements to the upper bounds for the number of equiangular lines possible in certain low dimensions.

In this talk, we consider a generalisation of this phenomenon to the complex setting. In particular, we will present conjecturally sharp upper bounds on the number of residue classes of the characteristic polynomial of Hermitean matrices of powers of ζ, modulo ideals generated by powers of $(1 - \zeta)$, where ζ is a root of unity.