Norm invariance method and applications

(Talk)

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Difference set existence can be viewed as motivation for generating polynomials $f(\varepsilon) \in \mathbb{Z}[\varepsilon]$, where ε is some root of unity, with additional property that $|f(\varepsilon^{(t)})| = cons.$ for all $t \in \mathbb{Z}$ such that $\varepsilon^t \neq 1$. Especially, we are focused on 2-groups and associated Hadamard difference sets. Using completely characterization of such polynomials, we are able to develop existence criteria for Hadamard difference sets existence which has the same domain of application as famous Turyn-Ma-Dillon theory which use possible existence of cyclic or dihedral image of hypothetic Hadamard group. Additionally, we are able, using newly developed norm invariance approach, to cover Turyn result on Hadamard circulant existence status for $\mathbb{Z}_{4u^2}$ where u is even.

MSC2010: 05B10, 05B05.

Keywords: difference set, Hadamard group, polynomial, norm.

Section: Combinatorics.

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