

# Symplectic semifield spreads of $\text{PG}(5, q^t)$ , $q$ even

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## Abstract

Let  $q > 2 \cdot 3^{4t}$  be even. We prove that the only symplectic semifield spread of  $\text{PG}(5, q^t)$ , whose associate semifield has center containing  $\mathbb{F}_q$ , is the Desarguesian spread. Equivalently, a commutative semifield of order  $q^{3t}$ , with middle nucleus containing  $\mathbb{F}_{q^t}$  and center containing  $\mathbb{F}_q$ , is a field. We do that by proving that the only possible  $\mathbb{F}_q$ -linear set of rank  $3t$  in  $\text{PG}(5, q^t)$  disjoint from the secant variety of the Veronese surface is a plane of  $\text{PG}(5, q^t)$ .

*Keywords:* Semifields, spreads, symplectic polarity, linear sets, Veronese variety.

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# Simplektična polobsegovna razdelitev $PG(5, q^t)$ pri sodem $q$

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## Povzetek

Naj bo  $q > 2 \cdot 3^{4t}$  sod. Dokažemo, da je edina simplektična polobsegovna razdelitev projektivnega prostora  $PG(5, q^t)$ , katere pridruženi polobseg ima center, ki vsebuje  $\mathbb{F}_q$ , Desarguesova razdelitev. Ekvivalentno, komutativen polobseg reda  $q^{3t}$  s srednjim nukleusom, ki vsebuje  $\mathbb{F}_{q^t}$ , in centrom, ki vsebuje  $\mathbb{F}_q$ , je obseg. To storimo tako, da dokažemo, da je edina možna  $\mathbb{F}_q$ -linearna množica ranga  $3t$  v  $PG(5, q^t)$ , ki je disjunktna s sekantno raznoterostjo Veronesejeve ploskve, lahko le ravnina v  $PG(5, q^t)$ .

*Ključne besede:* Polobsegi, razdelitve, simplektična polarnost, linearne množice, Veronesejeva raznoterost.

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