

Translation dual of a semifield

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Abstract

An alternative description of the translation dual of a semifield introduced in *G. Lunardon, Translation ovoids*, J. Geom., **76** (2003), will be given. Using such a description, and combining it with results concerning Knuth operations, we will show that a semifield and its translation dual have nuclei of the same order. In virtue of these theorems, the following table on the chain of twelve semifields obtaining from a given one, using the Knuth and the translation dual operations, is provided:

Semifield	Dim. over N_l	Dim. over N_m	Dim. over N_r
\mathbb{S}	2	m	r
\mathbb{S}^*	r	m	2
\mathbb{S}^T	2	r	m
\mathbb{S}^{*T}	r	2	m
\mathbb{S}^{T*}	m	r	2
\mathbb{S}^{*T*}	m	2	r
\mathbb{S}^\perp	2	m	r
$\mathbb{S}^{\perp*}$	r	m	2
$\mathbb{S}^{\perp T}$	2	r	m
$\mathbb{S}^{\perp*T}$	r	2	m
$\mathbb{S}^{\perp T*}$	m	r	2
$\mathbb{S}^{\perp*T*}$	m	2	r

Table 1: The twelve semifields and their nuclei