

NUCLEI OF SEMIFIELDS

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The geometric interpretation of Knuth's cubical array explained [1] and in [2] produces a bijection between planes associated with a symplectic spread and planes coordinatized by a commutative semifield.

We know that the collineation groups of the six semifield planes obtained from the cubical array have the same order. As any nucleus of a semifield defines a particular group of homologies, it is natural asking if the six semifield planes have groups of homologies of the same order and this question too seems not to have been studied. We prove that the orders of the nuclei are permuted with given rules. Applying these rules, we are able to prove that a symplectic semifield of dimension n over its left nucleus defines a commutative semifield of the same dimension over its middle nucleus.

References

- [1] S. Ball, M. Brown: The six semifield planes associated with a semifield flocks. *Adv. Math.*, 189 (2004), 68-87.
- [2] W.M. Kantor: Commutative semifields and symplectic spreads. *J. Algebra* 270 (2003) 96-114.