

Finite semifields

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In this talk we will give an introduction to the theory of finite semifields, first studied by L. E. Dickson in 1905 [1]. His motivation was purely algebraic: what happens if you drop the axiom of associativity for multiplication in the definition of a finite (skew)field? This question arose naturally, as it was shown that the axiom of commutativity for multiplication could be removed in the axiomatic definition of a finite field (Dickson-Wedderburn).

Nowadays these (nonassociative) algebraic structures are called *semifields*, a notion introduced by Knuth [2]. They turn up in various areas of mathematics, and play a key role in finite geometry.

We will introduce the basic concepts, give some examples and first results in the theory of finite semifields, and conclude with some applications. We will follow the notation and terminology from [3].

References

- [1] L. E. Dickson: Linear algebras in which division is always uniquely possible. *Trans. Amer. Math. Soc.*, 7(3), 370–390, 1906.
- [2] D. E. Knuth. Finite semifields and projective planes. *J. Algebra*, 2, 182–217, 1965.
- [3] M. Lavrauw, O. Polverino: *Finite semifields*, Chapter 6 in Current research topics in Galois Geometry (J. De Beule and L. Storme, Eds.), NOVA Academic Publishers, Pub. Date 2011, ISBN: 978-1-61209-523-3.