

# Nilpotent linearized polynomials and applications

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We introduce and investigate nilpotent linearized polynomials (NLPs) over finite fields, examining their arithmetic properties as well as structural aspects derived from linear algebra. In particular, we present a method for constructing permutations of finite fields using NLPs and analyze the properties of these permutations, including cycle decomposition and the presence of fixed points. Special attention is given to the case of binary fields (fields of characteristic two), where we develop a systematic approach for generating NLPs (and thus permutations) by leveraging trace orthogonal bases.