

Additive decompositions induced by multiplicative characters over finite fields

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In 1952, Perron showed that quadratic residues in a field of prime order satisfy certain additive properties. This result has been generalized in different directions, and our contribution is to provide a further generalization concerning multiplicative quadratic and cubic characters over any finite field. In particular, recalling that a character partitions the multiplicative group of the field into cosets with respect to its kernel, we will derive the number of representations of an element as a sum of two elements belonging to two given cosets. These numbers are then related to the equations satisfied by the polynomial characteristic functions of the cosets. Further, we show a connection, a quasi-duality, with the problem of determining how many elements can be added to each element of a subset of a coset in such a way as to obtain elements still belonging to a subset of a coset.

Comments: to be presented at Fq10

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