

# Value sets of polynomials and the Cauchy Davenport theorem by Pinaki Das

We define an invariant for any finite sequence of elements belonging to a field. We find a lower bound for the cardinality of the underlying set of distinct elements of the finite sequence in terms of this invariant. We use this bound to study sumsets of finite subsets of a given field. The motivation for our method comes from a lower bound on the value set of a polynomial over a finite field, considered by Wan et al. We give a new proof of the Cauchy Davenport theorem and show how it may be applied in the case of prime power fields. We apply our results to study value sets of diagonal polynomials over finite fields. Our methods may have applications to Waring's problem over prime power fields. This calls for further investigations.