

Decoding Designs

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(joint work with Alfred Wassermann)

The characteristic vectors of a Steiner system are considered as code vectors. Large blocks with small intersections allow to correct many errors. We use the construction of such designs from orbits of a prescribed group action for a fast error correction. In the case of a 3 - $(q^n, q + 1, 1)$ with the prescribed action of $PGL(2, q)$ up to $q - 1$ errors can be corrected by matrix multiplications. The Las Vegas type algorithm needs m steps with a probability decreasing fast with m growing. The approach is generalized to t -wise balanced designs obtained from the 3 - $(q^n, q + 1, 1)$ by truncating sets from systems of imprimitivity and to Steiner packings.

MSC2000: 05B07, 05B40.

Keywords: Steiner systems, defining sets, codes.