Abstract

Performance of extremal codes

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Assume that a binary linear code is transmitted over a channel with the symbol error probability p and that bounded distance decoding is used. In this case it is known [3] that for sufficiently small p the performance of the code is only a question of the weight distribution (weight enumerators of more efficient codes are lexicographically smaller).

Based on this result we study the efficiency of extremal self-dual codes.

Extremal doubly-even codes have unique weight enumerators for each length, and at first glance it may seem that these codes should perform worse than other codes with the same minimum distance. However we show that this is not always the case when comparing to singly-even codes. We also show that a doubly-even code may perform better than a non self-dual code.

We find the most efficient codes among extremal singly-even codes of length $24m + 8$ and $24m + 16$. We also consider some families of extremal singly-even codes with uniquely determined weight enumerators (s-extremal codes, codes with minimal shadow). It appears that they always perform better than extremal doubly-even codes of the same length.

The results are joint work with Wolfgang Willems (Magdeburg).

References

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