

Seminar

Support-Constrained Generator Matrix

The necessary and sufficient conditions for the existence of Reed-Solomon codes with support constrained generator matrices were conjectured by Dau et al. [1]. This is referred to as the GM-MDS conjecture, which was worked on by many researchers in [2-9] and finally proved by Yildiz and Hassibi [10] and independently by Lovett [11].

The objective of this work is to get an overview on the existing researches on GM-MDS conjecture and to summarize the methods used in the referenced papers for proving the GM-MDS conjecture.

References:

- [1] S. H. Dau, W. Song, and C. Yuen, "On the existence of MDS codes over small fields with constrained generator matrices," in 2014 IEEE International Symposium on Information Theory. IEEE, 2014, pp. 1787–1791.
- [2] W. Halbawi, T. Ho, H. Yao, and I. Duursma, "Distributed Reed–Solomon codes for simple multiple access networks," in 2014 IEEE International Symposium on Information Theory. IEEE, 2014, pp. 651–655.
- [3] M. Yan, A. Sprintson, and I. Zelenko, "Weakly secure data exchange with generalized Reed–Solomon codes," in 2014 IEEE International Symposium on Information Theory. IEEE, 2014, pp. 1366–1370.
- [4] W. Halbawi, Z. Liu, and B. Hassibi, "Balanced Reed–Solomon codes," in 2016 IEEE International Symposium on Information Theory (ISIT). IEEE, 2016, pp. 935–939.
- [5] W. Halbawi, Z. Liu, and B. Hassibi, "Balanced Reed–Solomon codes for all parameters," in 2016 IEEE Information Theory Workshop (ITW). IEEE, 2016, pp. 409–413.
- [6] A. Heidarzadeh and A. Sprintson, "An algebraic-combinatorial proof technique for the GM-MDS conjecture," in 2017 IEEE International Symposium on Information Theory (ISIT). IEEE, 2017, pp. 11–15.
- [7] W. Song and K. Cai, "Generalized Reed–Solomon codes with sparsest and balanced generator matrices," in 2018 IEEE International Symposium on Information Theory (ISIT). IEEE, 2018, pp. 1–5.
- [8] H. Yildiz and B. Hassibi, "Further progress on the GM-MDS conjecture for Reed–Solomon codes," in 2018 IEEE International Symposium on Information Theory (ISIT). IEEE, 2018, pp. 16–20.
- [9] G. Greaves and J. Syatriadi, "Reed–Solomon codes over small fields with constrained generator matrices," IEEE Transactions on Information Theory, 2019.
- [10] H. Yildiz and B. Hassibi, "Optimum linear codes with support constraints over small fields," in 2018 IEEE Information Theory Workshop (ITW). IEEE, 2018, pp. 1–5.
- [11] S. Lovett, "MDS matrices over small fields: A proof of the GM-MDS conjecture," in 2018 IEEE 59th Annual Symposium on Foundations of Computer Science (FOCS). IEEE, 2018, pp. 194–199.

Prerequisites

Linear Algebra

Channel Coding

Coding Theory for Storage and Networks (preferred)

Advisors

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