

MILP models of mixed Hamming packings: improved upper bounds

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We consider mixed Hamming packings, minimum codeword Hamming distances of mixed codes, using mixed integer programming. We introduce a reduction technique based on our idea of adopting the notion of contact graphs, motivated by continuous sphere packing problems. Our reduction technique helps in solving the respective mixed integer programs efficiently. Using the technique, we have improved various best known upper bounds of maximal cardinalities of Hamming packings with a given minimum distance for binary-ternary codes. Our approach can work for bigger problem instances, and is not restricted to binary-ternary codes. In spite of the limited number of variables in the models they are challenging for classical solvers. This suggests that their further study may yield benchmark problems for quantum computers that bear practical relevance.

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References

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