

Parity-check codes from disjunct matrices

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The matrix representations of linear codes have been well-studied for use as disjunct matrices. In this talk we make a connection between the properties of disjunct matrices and the parity-check codes obtained from them. We provide some fundamental results on parity-check codes from general disjunct matrices (in particular, a minimum distance bound). We then consider specific constructions of disjunct matrices and provide parameters of their corresponding parity-check codes including rate, distance, girth, and density. We show that, by choosing the correct parameters, the codes constructed have the best possible error-correction performance after one round of bit-flipping decoding with regard to a modified version of Gallager's bit-flipping decoding algorithm. (Based on joint work with Emily McMillon)

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