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Abstract

Construction C (also known as Forney's multi-level code formula) forms an Euclidean code for the additive white Gaussian noise (AWGN) channel from L binary code components. If the component codes are linear, then the minimum distance and kissing number are the same for all the points. However, while in the single level ($L = 1$) case it reduces to lattice Construction A, a multi-level Construction C is in general not a lattice.

We show that a two-level ($L = 2$) Construction C satisfies Forney's definition for a geometrically uniform constellation. Specifically, every point sees the same configuration of neighbors, up to a reflection of the coordinates in which the lower level code is equal to 1. In contrast, for three levels and up ($L \geq 3$), we construct examples where the distance spectrum varies between the points, hence the constellation is not geometrically uniform.

Joint work with Maiara Bollauf.