

Capacity Via Symmetry II: General Channels and Weight Distribution

Ruediger Urbanke, EPFL

In part I of this talk, we have seen how code symmetry allows us to achieve channel capacity — over the BEC. But what about general channels?

I will discuss one aspect of the proof that can be generalized, namely how to pass from bit-MAP thresholds to block-MAP thresholds. This approach is based on the analysis of the weight distribution of Reed-Muller codes. In particular, the flavor of the main result is the following: assume that the bit-MAP error probability decays as $N^{-\delta}$, for some $\delta > 0$. Then, the block-MAP error probability also converges to 0. This technique applies to the transmission over any binary memoryless symmetric channel. Thus, it can be thought of as a first step in extending the proof that RM codes are capacity-achieving to the general case.

Based on joint work with Kudekar, Kumar, Mondelli, and Pfister.