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Using concatenated algebraic geometry codes in channel polarization.

In this talk, we will be talking about using concatenated algebraic geometry codes as polar codes. Polar codes were introduced by Arikan in 2008 and are the first family of error-correcting codes achieving the symmetric capacity of an arbitrary binary-input discrete memoryless channel under low complexity encoding and using an efficient successive cancellation decoding strategy. Recently, non-binary polar codes have been studied, in which one can use different algebraic geometry codes to achieve better error decoding probability. We will start this talk by defining what polar codes and channel polarization are and then we will talk about the performance of binary polar codes that are obtained from non-binary algebraic geometry codes using concatenation. For binary polar codes (i.e. binary kernels) of a given length n, we compare numerically the use of short algebraic geometry codes over large fields versus long algebraic geometry codes over small fields. We find that for each n there is an optimal choice. For binary kernels of size up to 1,800 a concatenated Reed-Solomon code outperforms other choices. For larger kernel sizes concatenated Hermitian codes or Suzuki codes will do better. (Received September 04, 2014)