

Rateless coding for Gaussian channels and Perfect Incremental Redundancy

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Rateless channel codes are good codes of infinite length whose prefixes are themselves good. This makes them attractive for applications with uncertain channel quality, where systems transmit as much of a codeword as necessary to enable decoding. In particular, rateless codes are potentially attractive for wireless communications.

While low-complexity rateless codes exist for the erasure channel, we show they can also be constructed for a Gaussian channel from

good binary "base" codes. We show that efficient codes that achieve any target fraction of the realized channel capacity can be readily constructed.

Moreover, a simple refinement of the approach gives perfect incremental redundancy codes, which are fully capacity-achieving at multiple realized signal-to-noise ratios.