

Expurgated Bounds for the Asymmetric Broadcast Channel

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Abstract

This work contains two main contributions concerning the expurgation of hierarchical ensembles for the asymmetric broadcast channel. The first is an analysis of the optimal maximum likelihood (ML) decoders for the weak and strong user. Two different methods of code expurgation will be used, that will provide two competing error exponents. The second is the derivation of expurgated exponents under the generalized stochastic likelihood decoder (GLD). We prove that the GLD exponents are at least as tight as the maximum between the random coding error exponents derived in an earlier work by Averbuch and Merhav (2017) and one of our ML-based expurgated exponents. By that, we actually prove the existence of hierarchical codebooks that achieve the best of the random coding exponent and the expurgated exponent simultaneously for both users.

Index Terms: Asymmetric broadcast channel, error exponent, expurgated exponent, likelihood decoder.

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