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On Zero–Rate Error Exponents of Finite–State Channels with Input–Dependent States

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Abstract

We derive a single–letter formula for the zero–rate reliability (error exponent) of a finite–state channel whose state variable depends deterministically (and recursively) on past channel inputs, where the code complies with a given channel input constraint. Special attention is then devoted to the important special case of the Gaussian channel with inter-symbol interference (ISI), where more explicit results are obtained.

Index Terms: Error exponents, Bhattacharyya distance, expurgated codes, finite–state channels, Markov types.