On the Error Exponent of the Two-way Gaussian Channel

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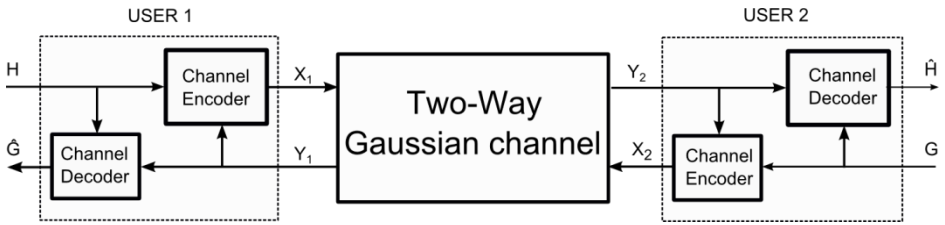


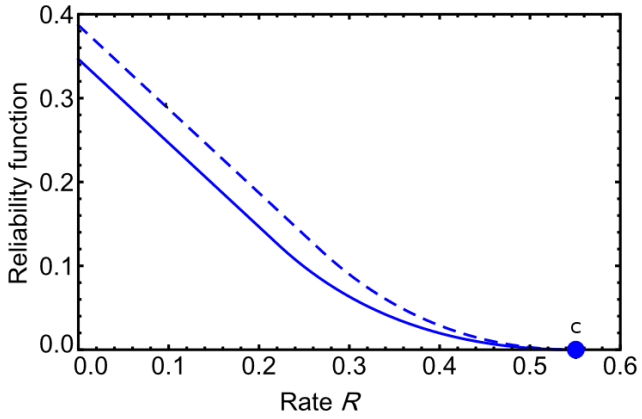
$$Y_1 = aX_1 + bX_2 + N_1$$
$$Y_2 = cX_1 + dX_2 + N_2$$

Problem Statement and Motivation

- Shannon introduced the Gaussian Channel in 1948.
- Channel coding theorem states that for any rate R below the channel capacity C, the probability of error can be made arbitrarily small , $P_e \to 0$ as the block length n goes to infinity, $n \to \infty$
- Infinite block lengths are not practical, therefore, the exponential decay of error probability needs to be studied.
- The reliability function of the one-way Gaussian channel is already known for AWGN communication schemes with and without feedback but it is not for the TWGC.

Technical Approach

- Reliability function example:



Key Achievements and Future Goals

- As work is still in progress we present some future goals:
  - Error exponent results of a single bit transmission over a one-way Gaussian channel with feedback may be used to study the error exponent of the two-way Gaussian channel.
  - For TWGC, we expect to characterize the trade off between error exponents in the two communication directions.

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