

This MATLAB code simulates a communication system employing Binary Phase Shift Keying (BPSK) modulation and calculates the Bit Error Rate (BER) performance under different signal-to-noise ratio (E_b/N_0) values. Here's a breakdown of what each part of the code does:

Initialization: Sets the number of bits (N), initializes the random number generators for generating data and noise.

Transmitter:

Generates a random binary sequence (ip) of length N .

Maps binary bits to BPSK symbols (s).

Generates Gaussian noise (n) with zero mean and unit variance.

Simulation Loop:

Iterates over different E_b/N_0 values.

Adds noise to the transmitted signal.

Performs hard decision decoding by thresholding the received signal.

Counts the number of errors between the transmitted and received bits.

BER Calculation:

Computes the simulated BER ($simBer$) by dividing the number of errors by the total number of bits.

Computes the theoretical BER ($theoryBer$) using the Q-function (erfc function).

Plotting:

Plots the theoretical BER and simulated BER against E_b/N_0 values on a logarithmic scale.

Labels the axes and adds a title to the plot.

This code will generate a plot showing the theoretical and simulated BER performance of a BPSK modulation system over a range of E_b/N_0 values.