72.630 Capacity enhancement methods for radio interface
To be returned before 26.02.2005

Home assignment 3

1.

The system contains two transmission antennae and one receive antenna.

Two 8PSK modulated symbols are mapped accordingly to Alamouti coding and transmitted to the receiver.

The two consequent received samples are

$$y = \begin{bmatrix} -0.1146 + i0.0291 & -0.6919 - i0.0623 \end{bmatrix}$$

The signal to noise ratio is 5 dB.

The channel is known with coefficients
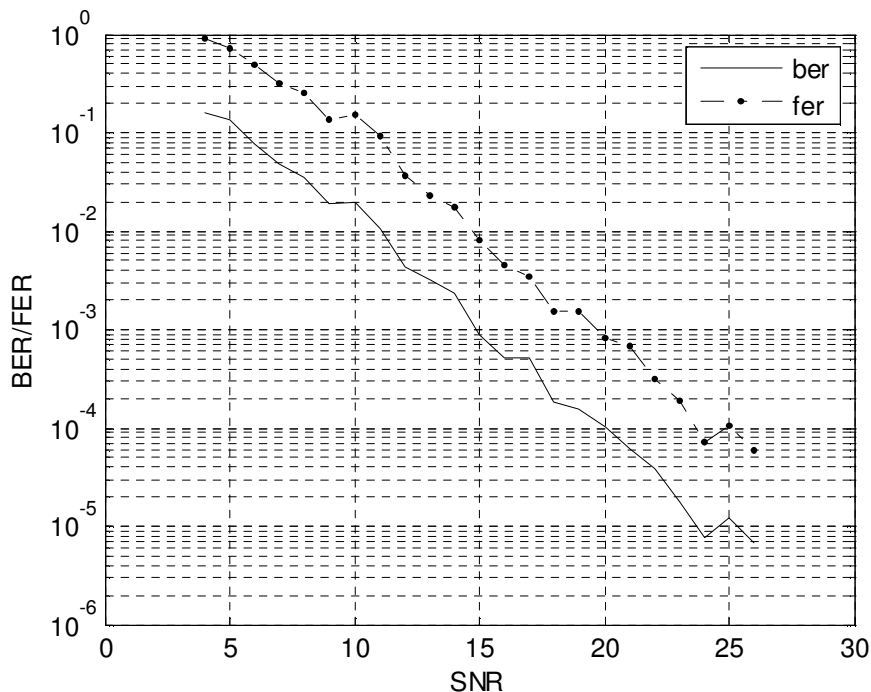
$$h_{11} = -0.3177 - i0.2798$$

$$h_{12} = 0.2218 - i0.4750$$

Calculate the symbol probability for each possible transmitted symbol.

Calculate the loglikelihood ratio of the probabilities for each possible bit based on the marginal bit probabilities calculated from the symbols.

2.

The simulated BER and FER curves of a system are given on Figure 1.

Describe in what kind of system this curves have been generated if it is known that the frame size is 2000 bits.
What is diversity in the system?
Does the system include forward error correction coding?
What kind of transmit and receive antenna configurations the system might have?
What kind of space-time coding, if any, have been used?