Channel Equalization Using Adaptive Zero Forcing Technique in Rayleigh Fading Channel

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Objectives Summary-

- Rayleigh Channel represents the multipath fading channel model with no dominant LOS (line of sight) path.
- Rician Channel represents the fading channel model with dominant LOS (line of sight) path.
- The major challenges in any channel model are fading and interference effects.
- To overcome the above limitation, several equalization techniques are employed.
- ISI (inter symbol interference) is the main cause of the error for the detection of signal at receiver side.
- To remove this ISI and improve the BER (bit error rate), Zero Forcing Equalization technique and other technique like MMSE, ML etc. are implemented.
- For channel equalization, the technique used is Zero Forcing technique which consists of the inverse function of the impulse response of the channel.
- This inverse function is multiplied with the received signal to force the ISI to be zero.
- We have assumed 2X2 MIMO system, modulated with the BPSK modulation scheme.
- Proposed method for equalization in this paper is Adaptive Zero Forcing Equalization Technique which is implemented by using Least Mean Square Algorithm.
- If the channel time variant the coefficient of least mean square algorithm are changed according to the changes in the channel.
- Adaptive Equalization provide efficient BER rates when channel is time variant.
- Results for adaptive equalization technique are shown by plotting BER vs SNR curve.

Project Progress-

- Random generation of the data bits as message signal to be transmitted through the channel.
- Modulation of the digital signal with BPSK modulation scheme.
- Transmission of the signal through three different channel - AWGN, Rayleigh and Rician Channel in the presence of Gaussian noise.
- Equalization of the channel with Zero Forcing Technique.
- Comparing the BER curve plot in different channels.