Masterthesis

Frequency prediction of the channel transfer functions in multiple antenna systems

Having the channel state information (CSI) of the channels over which the signals propagate from the transmitter to the receiver available at both sides of the transmission link is beneficial in many wireless applications. However, in frequency division duplex (FDD) systems, a base station (BS) can only estimate the channel transfer function (CTF) of the uplink channel based on the transmission of a priori known training signals from the mobile station (MS). A MS can only estimate the CTF of the downlink channel based on the transmission of a priori known training signals from the BS. Due to the frequency selective behavior of the mobile radio channel, the CTFs of the uplink channel are different from the CTFs of the downlink channel. In order to obtain the CSI of the downlink channel in the BS or the CSI of the uplink channel in the MS it is possible to feed back this information from the MS to the BS or from the BS to the MS. However, this feedback of the CSI decreases the spectral efficiency. Thus, it is desirable to obtain the knowledge of the downlink channel in the BS without any feedback from the MS.

In this work, the following tasks are expected to be completed.

• Inspection of state of the art techniques to predict the CTFs in single–input single–output (SISO) systems and in multiple–input multiple–output (MIMO) systems.
• Precisely analysis of linear techniques to predict the CTFs.
• Comparison of in general suboptimum Least Squares techniques to predict the CTFs and the optimum Wiener–Filter technique based on monte carlo simulations.

Literature


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