70. 이동 통신을 위한 개선된 송신 빔 형성기 설계

전파공학과 이 용 주
지도교수 김 기 만

Considering a wireless CDMA (code division multiple access) communication system over the multipath fading channel, the spatio-temporal processing at receiver seems quite beneficial because it could alleviate the fading effect and suppress various interferences over space and time domains simultaneously. The aim of receive beamforming is to form a spatial filter that passes the desired signals and suppress unwanted components. By contrast, the aim of transmit beamforming is to launch a signal into a propagation environment so that each receiver gets its desired signal without crosstalk from the signals intended for other receivers.

In this thesis, we propose a new downlink beamforming algorithm for array antenna in FDD (Frequency Division Duplex) environments. In a transmit mode, the antenna array at the base station needs to know the downlink channels as a means of optimizing its beampatterns. In a time division duplex (TDD) system, channel reciprocity provides a straightforward means of downlink channel estimation. For FDD, the presence of angle spread and delay spread causes a dramatic difference in the uplink and downlink channel vectors. Using the uplink signals to estimate the instantaneous downlink channel is not feasible in FDD systems for rich multipath channels typical in urban and suburban environments.

It was proposed that the new algorithm for correcting of a weak of point in FDD. In the proposed method it was estimated that the directions and power spectrum of the received signals, and construct the spatial covariance matrix at the downlink carrier frequency. To obtain the weight vector for beamforming, it is used that the criterion to be maximized by the SINR. The transmitted signal with the obtained weight vector has the multi-beam in each multi-path direction and the receiver forms the optimized beam in the wanted direction through the composition. The proposed method was compared with the conventional method to evaluate the performance of the proposed algorithm. To see the BER curve among the simulation results, it is confirmed that the proposed method has the improved capability (3dB~5 dB) at the point