71. 이동무선통신에서 OFDM을 적용한 시공간 부호의 성능평가

전파공학과 황 원 철
지도교수 김 기 만

Recently the rapid growth of wireless voice subscribers, the growth of the internet and the increasing use of portable computing devices suggest that wireless internet access will rise rapidly over the next few years. Wireless internet is demanded to increase the channel capacity and data rate. It is difficult to increase the channel capacity or reducing the effective error rate in a multipaths fading channel.

To solve the above problems in wireless communications, Tarokh et al. introduced space -time codes adopting a joint design of coding, modulation, and transmit diversity. Space-time coding introduces temporal and spatial correlation into signals transmitted from different antennas, in order to provide diversity at the receiver, and coding gain over an uncoded system without sacrificing the bandwidth. The spatial-temporal structure of these codes can be exploited to increase further the capacity of wireless systems with a relatively simple receiver structure. Simulation results show that at the frame error rate of the 32-state code with two receiver antennas gives about 3dB gain over the use of a 4 states and two receiver antennas with the 32-state code give about 6 dB gain over the use of one receiver antenna. It appears from the simulation results that the coding advantage obtained by increasing the number of states and diversity gain obtained by increasing the number of receive antenna.

This thesis also studies space-time codes applying orthogonal frequency division multiplexing (OFDM) systems in wireless communication. In OFDM, the entire channel is divided into many narrow parallel subchannels, thereby increasing the symbol duration and reducing or eliminating the intersymbol interference (ISI) caused by the multipath environments. At the frame error rate of the 32-state code with space-time codes applying OFDM gives about 7dB gain over the use of the 4-state code by simulation. Therefore, space-time codes applying OFDM systems can be used for highly efficient data transmission over mobile wireless channels.