Noncoherent Detection of MDPSK in DS-CDMA

賴昱廷、楊新雄

E-mail: 9121506@mail.dyu.edu.tw

ABSTRACT

In this thesis, we take an application of multiple symbol differential detection (MSDD) technique and Viterbi-decoding differential detection (VDDD) in direct-sequence code division multiple access (DS-CDMA) system. It is well known that MSDD is an effective noncoherent demodulator which outperform the conventional M-ary differential phase shift keying (MDPSK) in additive white Gaussian noise (AWGN) channels. Take MPSK demodulator into consideration, the performance of MSDD based on noncoherent demodulation approaches the performance of coherent demodulation. However, there is less research about MSDD in frequency-selective fading channel. We are now combining the MSDD and Rake receiver to be the signal demodulator. In conventional, there are two kinds of Rake receivers. One is coherent demodulator and another is noncoherent demodulator. For coherent demodulation, it needs to have channel estimation at each path. The advantage is that the performance will be improved. On the other hand, the disadvantage is complexity and operation will increase. On the contrast, for noncoherent demodulation, it is the performance degradation and complexity simplification. In this thesis, we suggest a multiple symbol differential detection on Rake receiver for DS-CDMA system. From out computer simulation, only for hard decision, the performance is improved and the improvement is proportional to the number of multipath and the number of the length of multiple symbol. This will not happen in conventional MDPSK. Moreover, we employee the technique of Viterbi-decoding differential detection to obtain additional improvement.

Keywords : DS-CDMA ; MDPSK ; Noncoherent Detection ; Multiple Symbol Differential Detection ; Rake Receiver

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