



Research Article



Multuser Detection for DS-CDMA Systems over Generalized-K Fading Channels using Particle Swarm Optimization

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ABSTRACT

In direct sequence-code division multiple accesses systems (DS-CDMA), the signals are transmitted over multipath channels that introduce fading. Multipath fading along with multiple access interference and inter-

symbol interference degrades the system performance. Further, simultaneous presence of multipath fading and shadowing leads to worsening of wireless channels. Moreover, experimental results have confirmed the presence of impulsive noise in wireless mobile communication channels. This paper presents a robust multuser detection technique for DS-CDMA systems over generalized-K (GK) fading channels in the presence of impulsive noise. Robust M-decor relating detector to demodulate binary phase shift keying (BPSK) signals is implemented by using the particle swarm optimization (PSO) algorithm. The PSO algorithm is used to obtain optimum M-estimates by minimizing an objective function, which is a sum of less rapidly increasing function of residuals. Simulation results are provided to show the evolutionary behavior and efficacy of the proposed M-estimator in comparison with linear decor relating detector, the Huber and the Hampel estimator based detectors.

Keywords: CDMA, influence function, maximal ratio combiner, M-estimator, multuser detection, Nakagami fading, particle swarm optimization.

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