A Novel Approach for Reducing the Computational Complexity of Multi-user Receivers in DS-CDMA Systems

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Abstract

Multiuser detection is a technique to improve the capacity and coverage in a code division multiple access (CDMA) system. Being a critical component of this technique, the maximum likelihood (ML) multiuser receiver has received extensive study. While many designs could achieve optimal performance, they significantly increase the computational complexity of the multiuser receivers. In this paper, a novel approach for reducing the asymptotic computational complexity of ML multiuser receivers is proposed for direct-sequence CDMA (DS-CDMA) wireless communication systems. We employ a novel transformation matrix technique based on the complex properties of inverse matrix algorithms. Simulation results are given to demonstrate the effectiveness of the proposed approach in different communication systems. In addition, our simulation results demonstrate the improved performance of the proposed approach over other popular approaches.