

Project 7
CDMA Interference Cancellation Using Iterative Methods

In wireless and optical applications, CDMA is an alternative to FDMA and TDMA. Some of the advantages are soft handoffs and soft degradation when the capacity is full. One of the problems with CDMA is the multi-user interference when the codes are not orthogonal or when the transmission is asynchronous, or when the CDMA capacity is overloaded. You are requested to use iterative methods to cancel or reduce the multi-user interference.

- 1- Define the operator G , and simulate various iterative methods (CA and CG) using Mathcad for the multi-user interference cancellations in both wireless and optical systems. In your simulations, use random codes, Gold codes and Optical Orthogonal Codes (OOC).
- 2- In the literature, there is a method called Parallel Interference Cancellation (PIC). Simulate it and compare it to the results of part 1.
- 3- Define a new G for PIC and use iteration on PIC. Compare your results to part 1 in terms of performance and complexity (computer time or number of arithmetic manipulations).
- 4- Your report does not need to be written like a paper. Just try to state the problem, show the simulations results and give a detailed analysis and conclusion

Reference

Verdu, *Multi-user Detection*,
A Viterbi, *CDMA, Principles of Spread Spectrum*, Addison-Wesley, 1995.