Homework No. 1

Simulation of Constrained TPC Algorithm

In this homework, you should apply constrained TPC algorithm to a simple CDMA network. The network conditions are chosen such that the system is feasible:

- Number of users Nu = 5
- Cell coverage area = $50\mathrm{m} \times 50\mathrm{m}$
- Background noise power σ^2= $10^{-10}\mathrm{W}$
- Maximum power of each user P_i = $1\mathrm{mW}$
- Target SINR $\widehat{\gamma}_i$=0.05
- Path gain h_i = $0.09d^{-3}$

Simulate the system under the above conditions. The users should be uniformly distributed in the cell.

1. Plot SINR and power of each user versus the number of iterations (a measure of time).
2. Now increase the number of users one-by-one to 10 users.
   - Compare the achieved SINR and Target-SINR for each user.
   - For how many users system becomes infeasible? Why?
   - Plot the number of admitted users versus the total number of users.
   - Can we increase the number of admitted users by changing the other parameters? How? Explain.
3. Now increase the users' Target-SINR from 0.01 to 1 by step size 0.01.
   - Plot the number of admitted users versus the total number of users.
   - For what Target-SINR system becomes infeasible? Why?
   - Can we increase the number of admitted users by changing the other parameters? How?
4. Changing which parameters can make system infeasible? Why?
5. Compare the transmit power of users in cases 1 and 3. Why the transmit power of users are different? Explain.