

## Part A

In part A, the diversity rules Max Ration Combining (MRC) and Selection Combining (SC) are implemented.

For the MRC diversity rule, simply multiple received signals in six paths with corresponding  $\beta$  respectively, and add them together, the result is gotten.

In the code, X\_task\_A has six rows, multiply each row of X\_task\_A with each element of  $\beta = [0.2 \ 0.5 \ 0.9 \ 0.5 \ 0.4 \ 0.6]$  respectively, and add them together, the result is gotten.

For the SC diversity rule, first calculate the SNR for each path. It is clear that path 3 has the highest SNR, hence only path 3 will be used.

The result is shown below:



BER\_MRC =  
0.0063



BER\_SC =  
0.0502

It is clear that MRC performs much better than SC, although these two figures still have many wrong pixels.

## Part B

In part B, CDMA and a RAKE receiver are implemented.

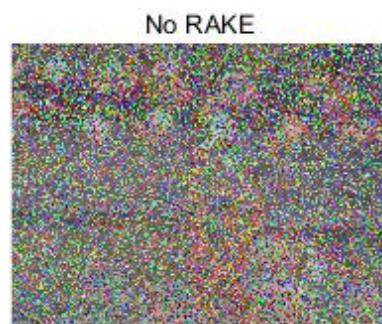
For CDMA-RAKE, apply six values of delay to the received signal. Then, reshape them to multiply with the gold-sequence for despreading. By multiplying them with corresponding  $\beta$  and sum together, the signal used to demodulation is gotten.

For CDMA with direct path, only the path with delay = 0 is used.

The result is shown below:



$$\text{BER}_{\text{rake}} = 1.5040\text{e-}04$$



$$\text{BER}_{\text{no}} = 0.1874$$

It is clear that CDMA-RAKE performs much better than the two methods in Part A and the CDMA with direct path.