

DSSS Simulation

Example main program

```
%%% Simulation parameters
% Barker code
code = [ 1 1 0 ];
% Data bits
L=3; % data length
Data = randi([0 1],1,L); % array of L random bits
disp(Data);
% Bit Error Rate (0 <= BER <=1)
BER=0.1;

%%% Encoding
S = encoder( Data, code );
disp(S);

%%% Channel
R = channel( S, BER );
disp(R);

%%% Decoding
D=decoder(R, code);
disp(D);
```

Example executions

>> myDSSSsimulator

0	0	1							
1	1	0	1	1	0	0	0	0	1
1	1	0	1	1	0	0	0	0	1
0	0	1							

Data

Sent DSSS sequence

Received DSSS sequence

Decoded data

>> myDSSSsimulator

1	0	0							
0	0	1	1	1	0	1	1	0	
0	0	1	1	1	1	1	1	0	
1	0								

Transmission error

Outline of encoder

```
>> disp(Data)
    0    0    1    0

>> disp(code)
    1    1    0

>> % make Data and code the same size

>> D=repline(Data,length(code)); % replicate the Data lines

>> disp(D)
    0    0    1    0
    0    0    1    0
    0    0    1    0

>> C=repcolumn(code',length(Data)); % transpose & replicate

>> disp(C)
    1    1    1    1
    1    1    1    1
    0    0    0    0

>> % DS spreading

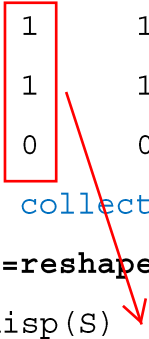
>> S=xor(D,C);

>> disp(S)
    1    1    0    1
    1    1    0    1
    0    0    1    0

>> % collect and return the column contents into a row vector

>> S=reshape(S,[1,1]);

>> disp(S)
    1    1    0    1    1    0    0    0    1    1    1    0
```



Outline of channel

```
>> disp(BER)
    0.1000
>> disp(S)
    1    1    0    1    1    0    0    0    1    1    1    0
>> % Generate random bit error positions
>> E = rand(1,length(S)) < BER;
>> disp(E)
    0    1    0    1    0    0    1    0    0    0    0    0
>> % Return bit sequence with random errors
>> R=xor(S,E);
>> disp(R)
    1    0    0    0    1    0    1    0    1    1    1    0
```

A peak at the decoder

```
>> disp(code)
```

```
1 1 0
```

```
>> disp(R)
```

```
1 1 0 1 1 0 0 0 1 1 1 0  
3 -1 -1 3 1 -1 -3 -1 1 3
```

```
D=decoder(R, code);
```

```
>> disp(D)
```

```
0 0 1 0
```



correlation