Diversity Performance Comparision

- Compare **BER versus SNR** between **SC, EGC, MRC**
- Each Combining applied for **two-path of Rayleigh Fading** with same average branch SNR

Rayleigh Realization

```
clear; clc;
realization = 1000000;
rayleigh1 = random('Rayleigh', 1/sqrt(2), realization, 1);
rayleigh2 = random('Rayleigh', 1/sqrt(2), realization, 1);
```

System Parameter

```
x = [0: 30];
SNR = 10 .^ (x/10);

SC_SER = zeros([30,1]); EGC_SER = zeros([30,1]);   MRC_SER = zeros([30,1]);
MRC_dBGain_EGC = zeros([30,1]);
for i = 1:30

branchSNR_1 = rayleigh1.^2 * SNR(i);
branchSNR_2 = rayleigh2.^2 * SNR(i);
```

Selection Combining

```
SC_SNR = max(branchSNR_1, branchSNR_2);
SC_SERinc = qfunc(sqrt(2 * SC_SNR));
SC_SER(i) = mean(SC_SERinc);
```

Equal Gain Combining

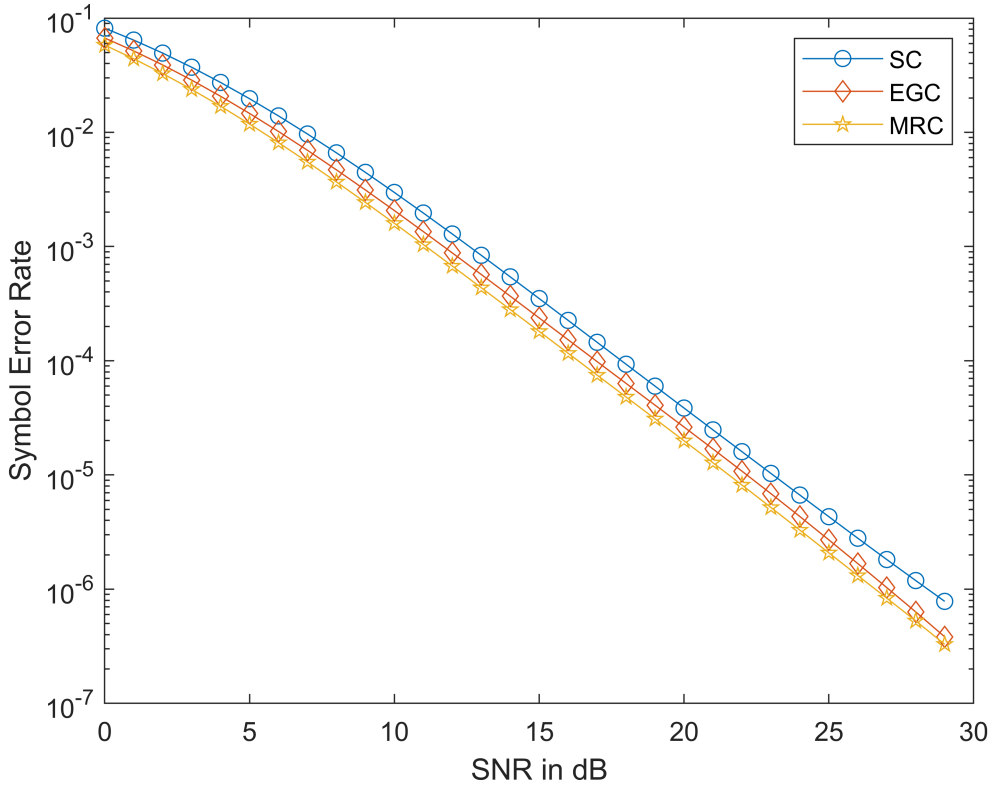
```
EGC_SNR = 0.5 * branchSNR_1 + 0.5 * branchSNR_2 + sqrt(branchSNR_1 .* branchSNR_2);
EGC_SERinc = qfunc(sqrt(2 * EGC_SNR));
EGC_SER(i) = mean(EGC_SERinc);
```

Maximal Ratio Combining

```
MRC_SNR = branchSNR_1 + branchSNR_2;
MRC_SERinc = qfunc(sqrt(2 * MRC_SNR));
MRC_SER(i) = mean(MRC_SERinc);
MRC_dBGain_EGC(i) = 10*log10(EGC_SER(i) / MRC_SER(i))  ;
end
```

Performance Plot

```
plt = semilogy(0:29, [SC_SER, EGC_SER, MRC_SER]);
legend({'SC', 'EGC', 'MRC'})
markers = {'o', 'diamond', 'pentagram'};
set(plt, {'Marker'}, markers(:))
xlabel('SNR in dB')
ylabel('Symbol Error Rate')
```




```
mean(MRC_dBGain_EGC) % We can find about 1dB gain by using MRC than EGC
```

```
ans = 1.0346
```