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Department

TSR DELAY LIMITED TRANSMISSION

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1 Aim of the Experiment

To show Throughput vs alpha analytic graph in TSR time delayed transmission :

2 Objective

To simulate using the software **MATLAB**

3 Observation and Results

We simulated the circuit in Matlab and obtained the following results.

3.1 Code snippet when random variables are taken as 1

Command Window

```
>> clear;
%This is the code when the exponential random variables are taken as 1
count1=1;
h=1;
g=1;
i1=1;
j1=1;
for alpha = 0 : 0.00001 : 1
        Yd=(2*power(abs(h),4)*power(abs(g),2)*alpha)/((2*power(abs(h),2)*power(abs(g),2)*0.02*alpha + (power
        Yo=Yd+rand;
        R=log2(1+Yo);
        a=0.02*Yo*(1-alpha);
        b=0.02*0.02*Yo*(1-alpha);
        c=2*alpha;
        d=2*0.02*Yo*alpha;
        u=sqrt(4*a*i1*j1/c);
        Pout=1-((exp((-d*i1/j1))*u).*besselj(1,u));
        Throughput=(1-Pout)*(1-alpha)*R/2;
        arrayx(count1)=alpha;
        arrayy(count1)=abs(Throughput);
        count1=count1+1;
end
subplot(2,1,1);
plot(arrayx,arrayy,'r');
clear;
xlabel(' Variation of Alpha');
ylabel( ' Variation of Throughput');
```

The code is :

```
clear;
count1=1;
h=1;
g=1;
i1=1;
j1=1;
for alpha = 0 : 0.00001 : 1
Yd=(2*power(abs(h),4)*power(abs(g),2)*alpha)/(
(2*power(abs(h),2)*power(abs(g),2)*0.02*alpha) +
(power(abs(h),2)*0.02*(1-alpha)) +(0.02*0.02*(1-alpha)) );
Yo=Yd+rand;
R=log2(1+Yo);
a=0.02*Yo*(1-alpha);
b=0.02*0.02*Yo*(1-alpha);
c=2*alpha;
d=2*0.02*Yo*alpha;
u=sqrt(4*a*i1*j1/c);
Pout=1-((exp((-d*i1/j1))*u).*besselj(1,u));
Throughput=(1-Pout)*(1-alpha)*R/2;
arrayx(count1)=alpha;
arrayy(count1)=abs(Throughput);
count1=count1+1;
end
subplot(2,1,1);
plot(arrayx,arrayy,'r');
clear;
xlabel(' Variation of Alpha');
ylabel( ' Variation of Throughput');
title(' Variation of Throughput with respect to Alpha ( RNV are
taken as 1 ) ');
```

3.2 Code snippet where random variables are variable

Command Window

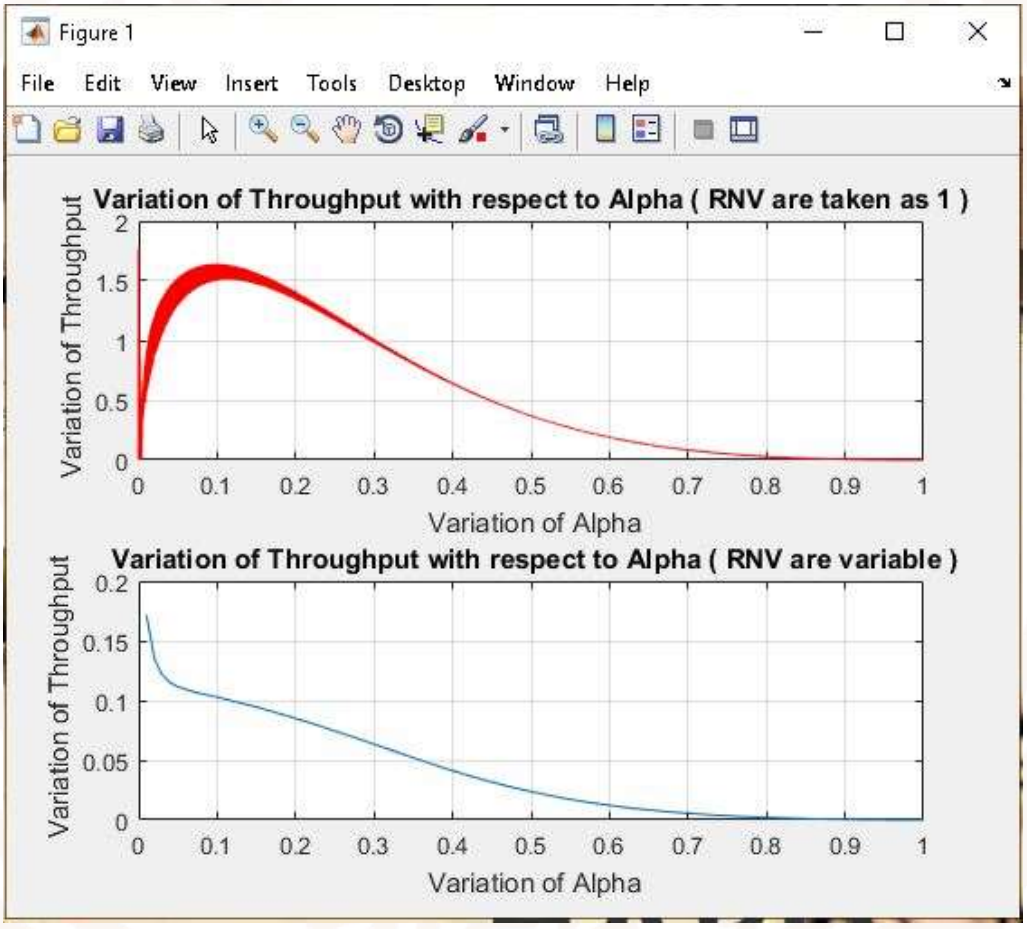
```
grid on;
clear;
%This is the code when the exponential random variables are variable
count1=1;
for alpha = 0.01 : 0.01 : 1
  count=0;
  sum=0;
  for i1 = 0.01 : 0.01 : 1.5
    for j1= 0.01 : 0.01 : 1.5
      for x = 0 : 5
        h=i1*exp(-i1*x);
        g=j1*exp(-j1*x);
        Yd=(2*power(abs(h),4)*power(abs(g),2)*alpha)/((2*power(abs(h),2)*power(abs(g),2)*0.02*a
        Yo=Yd+rand;
        R=log2(1+Yo);
        a=0.02*Yo*(1-alpha);
        b=0.02*0.02*Yo*(1-alpha);
        c=2*alpha;
        d=2*0.02*Yo*alpha;
        u=sqrt(4*a*i1*j1/c);
        Pout=1-((exp((-d*i1/j1))*u).*besselj(1,u));
        Throughput=(1-Pout)*(1-alpha)*R/2;
        count=count+1;
        sum= abs(Throughput)+sum;
      end
    end
  end
mean=sum/count;
arrayx(count1)=alpha;
arrayy(count1)=mean;
count1=count1+1;
end
subplot(2,1,2);
plot(arrayx,arrayy);
arrayx
arrayy
xlabel(' Variation of Alpha');
ylabel( ' Variation of Throughput');
title(' Variation of Throughput with respect to Alpha ( RNV are variable )');
grid on;
```

The code is :

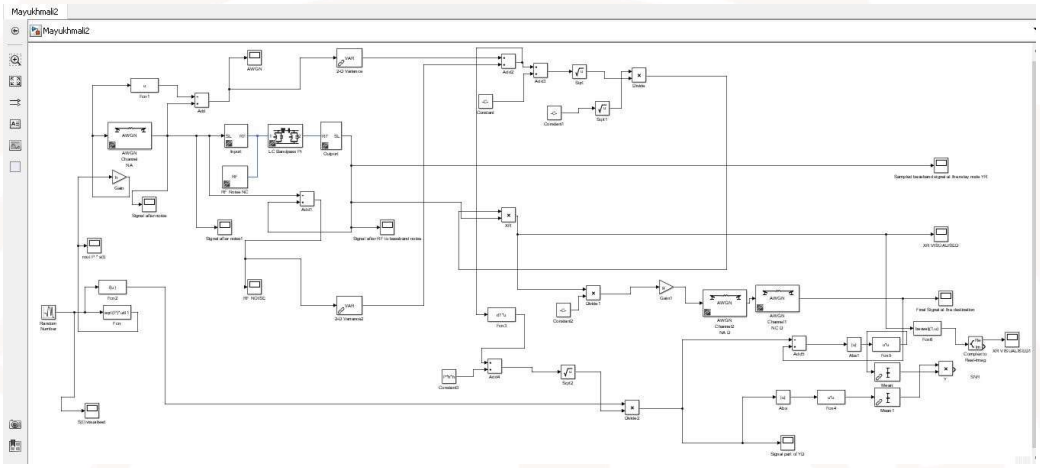
```
grid on;
clear;
count1=1;
for alpha = 0.01 : 0.01 : 1
count=0;
sum=0;
for i1 = 0.01 : 0.01 : 1.5
for j1= 0.01 : 0.01 : 1.5
for x = 0 : 5
h=i1*exp(-i1*x);
g=j1*exp(-j1*x);
Yd=(2*power(abs(h),4)*power(abs(g),2)*alpha)/(
(2*power(abs(h),2)*power(abs(g),2)*0.02*alpha) +
(power(abs(h),2)*0.02*(1-alpha)) +(0.02*0.02*(1-alpha)) );
Yo=Yd+rand;
R=log2(1+Yo);
a=0.02*Yo*(1-alpha);
b=0.02*0.02*Yo*(1-alpha);
c=2*alpha;
d=2*0.02*Yo*alpha;
u=sqrt(4*a*i1*j1/c);
Pout=1-((exp((-d*i1/j1))*u).*besselj(1,u));
Throughput=(1-Pout)*(1-alpha)*R/2;
count=count+1;
sum= abs(Throughput)+sum;
end
end
end
mean=sum/count;
arrayx(count1)=alpha;
arrayy(count1)=mean;
count1=count1+1;
end
subplot(2,1,2);
plot(arrayx,arrayy);
arrayx
arrayy
xlabel(' Variation of Alpha');
```

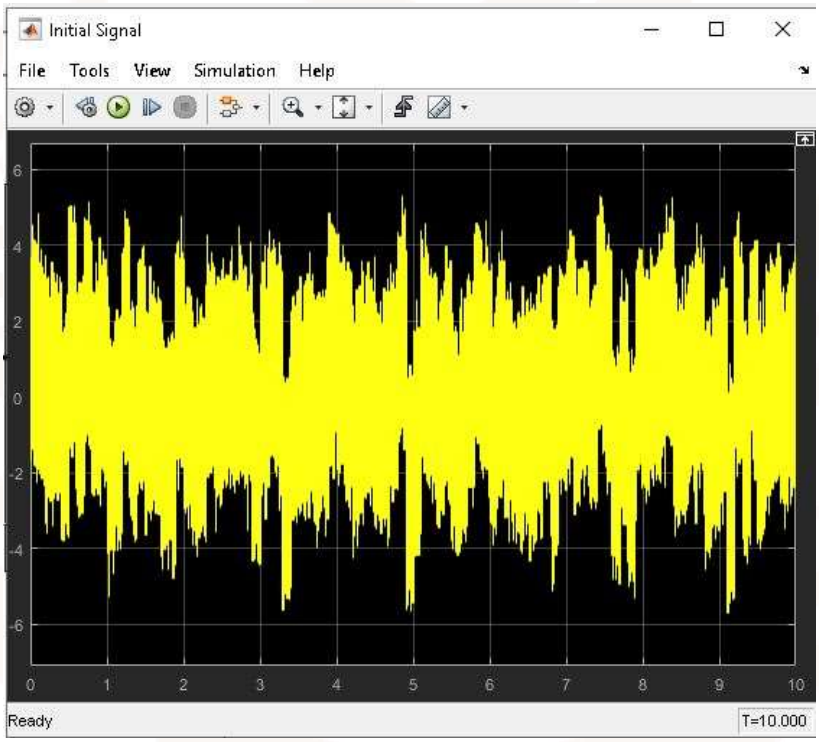
ylabel(' Variation of Throughput');
title(' Variation of Throughput with respect to Alpha (RNV are variable)');
grid on;

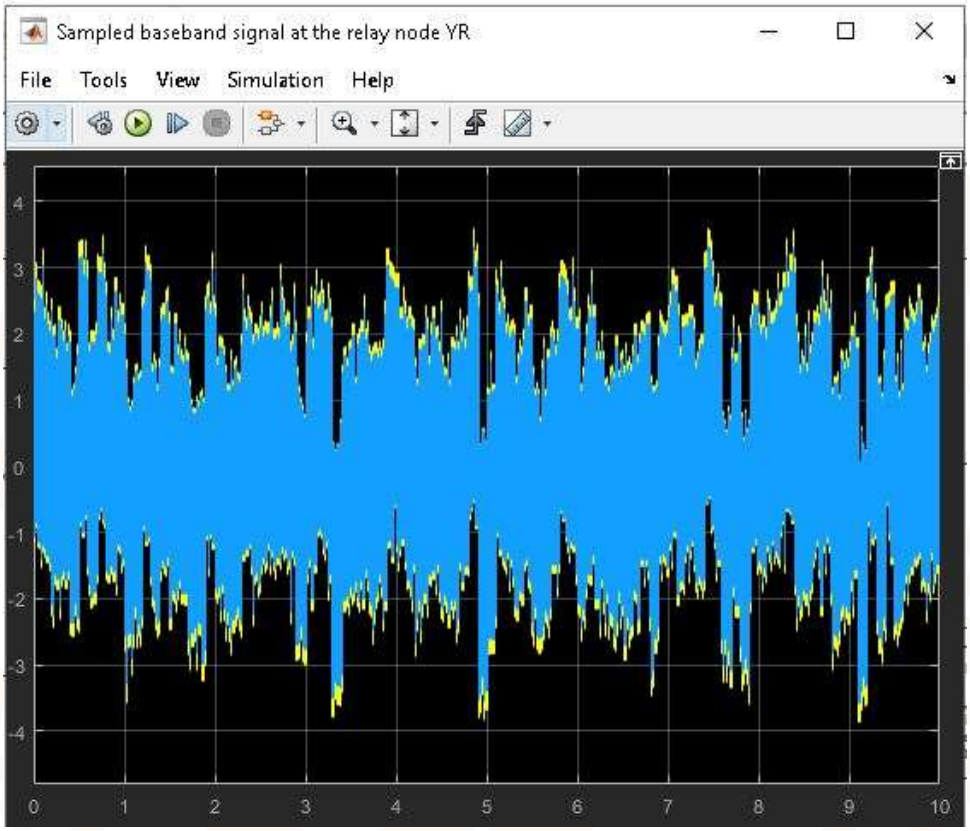
3.3 Simulated Graphs



3.4 Simulating TSR TD signal in Simulink







4 Conclusion

The simulation where monte carlo algorithm was applied with variation in the random variables show some deviations form that simulation where the random variables are 1 .