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Free space path loss + shadowing

AIM:

To perform Free space path loss + shadowing simulation using matlab for finding Receive power loss in dbm .

Free space path loss
Pr = Pt*GT*GR (1/(4*pi*R*lam)^2)

Free space path loss + shadowing
Pr = Pt*GT*GR (c/(4*pi*R*f)^2 + S

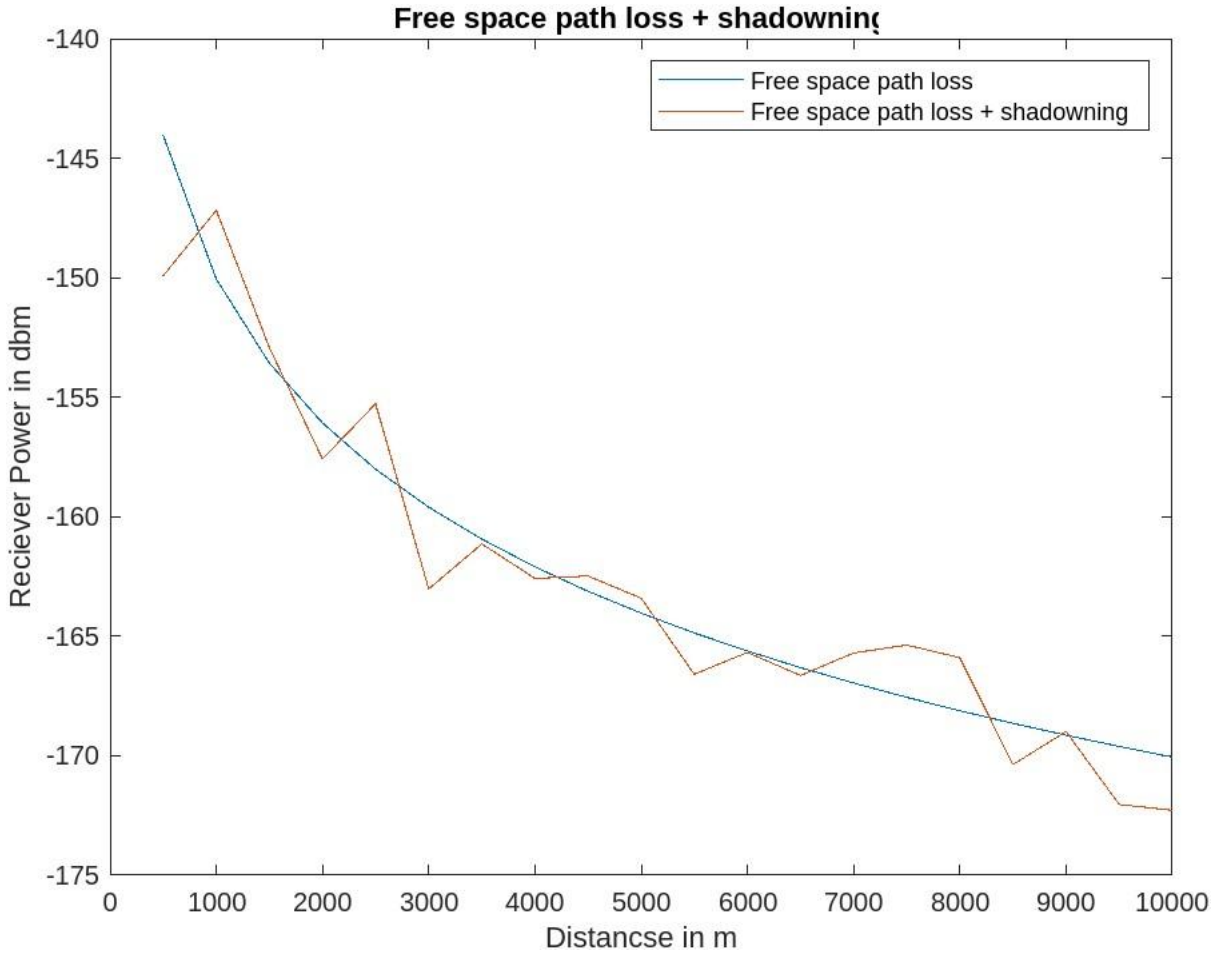
Ptdbm is Transmit power in db
GT is Transmit antenna gain
GR is % Receive antenna gain
lam is Wavelength
R is distance between the transmitter and receiver antenna
S is lognormal distribution

Working Code

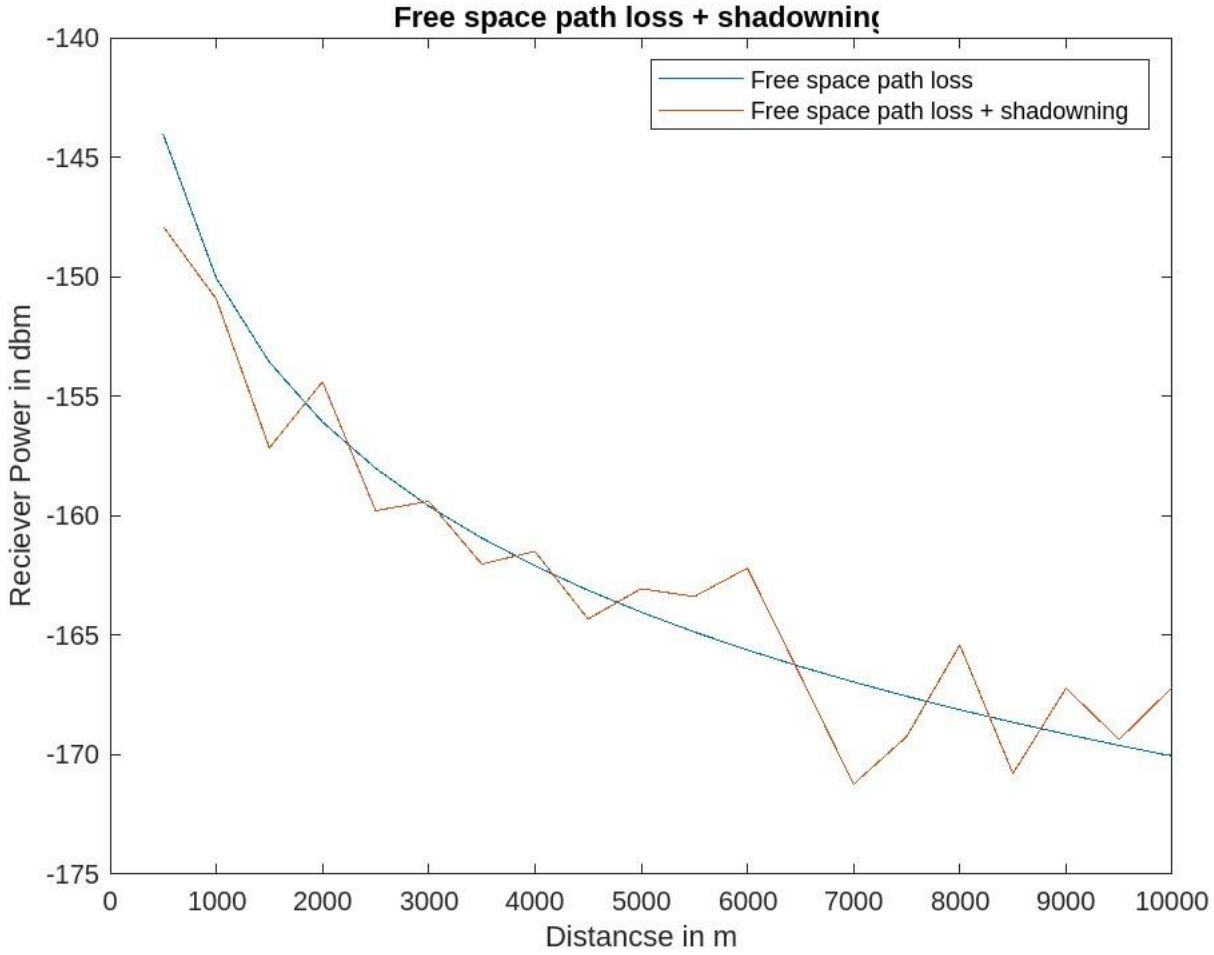
```
%Plot received power as function of distance
% Free space path loss Pr = Pt*GT*GR (1/(4*pi*R*lam)^2)
%Free space path loss + shadowing Pt = Pt*GT*GR (c/(4*pi*R*f)^2 + S
clear all; close all; clc; % Clear all data
Ptdbm = 10;  % Transmit power in db
GT = 1; % Transmit antenna gain
GR = 1; % Receive antenna gain
f = 2400000000; % frequency of carrier
SPL=299792458;     % Speed of light
lam = SPL/f; % Wavelength
Pt = 10^((Ptdbm-30)/10); % Transmit power in linear scale
R
=[0,500,1000,1500,2000,2500,3000,3500,4000,4500,5000,5500,6000,6500,7000,7500
,8000,8500,9000,9500,10000];%Init Distance
Prdbm = zeros(1,length(R));  % Init Received power in db
logshadow = zeros(1,length(R));  % Init Received power in db
Pr = zeros(1,length(R));  % Init Received power in db
for i=1:length(R)
   vari = lam/(4*pi*R(i));
    Pr(i) = Pt*GT*GR*vari^2;
    Prdbm(i) = 10*log10(Pr(i)/1000);
end
%plot Prdb vs Distance R
plot(R,Prdbm);
for i=1:length(R)
```

```
logshadow(i) = normrnd(0,2);
end
hold on;
%plot Prdbm+shadow vs Distance R
plot(R,Prdbm+logshadow);
hold off
xlabel('Distance in m');  % label x axis
ylabel('Receiver Power in dbm');  % label y axis
title('Free space path loss + shadowing');% Title
legend('Free space path loss','Free space path loss + shadowing');% Legend
```

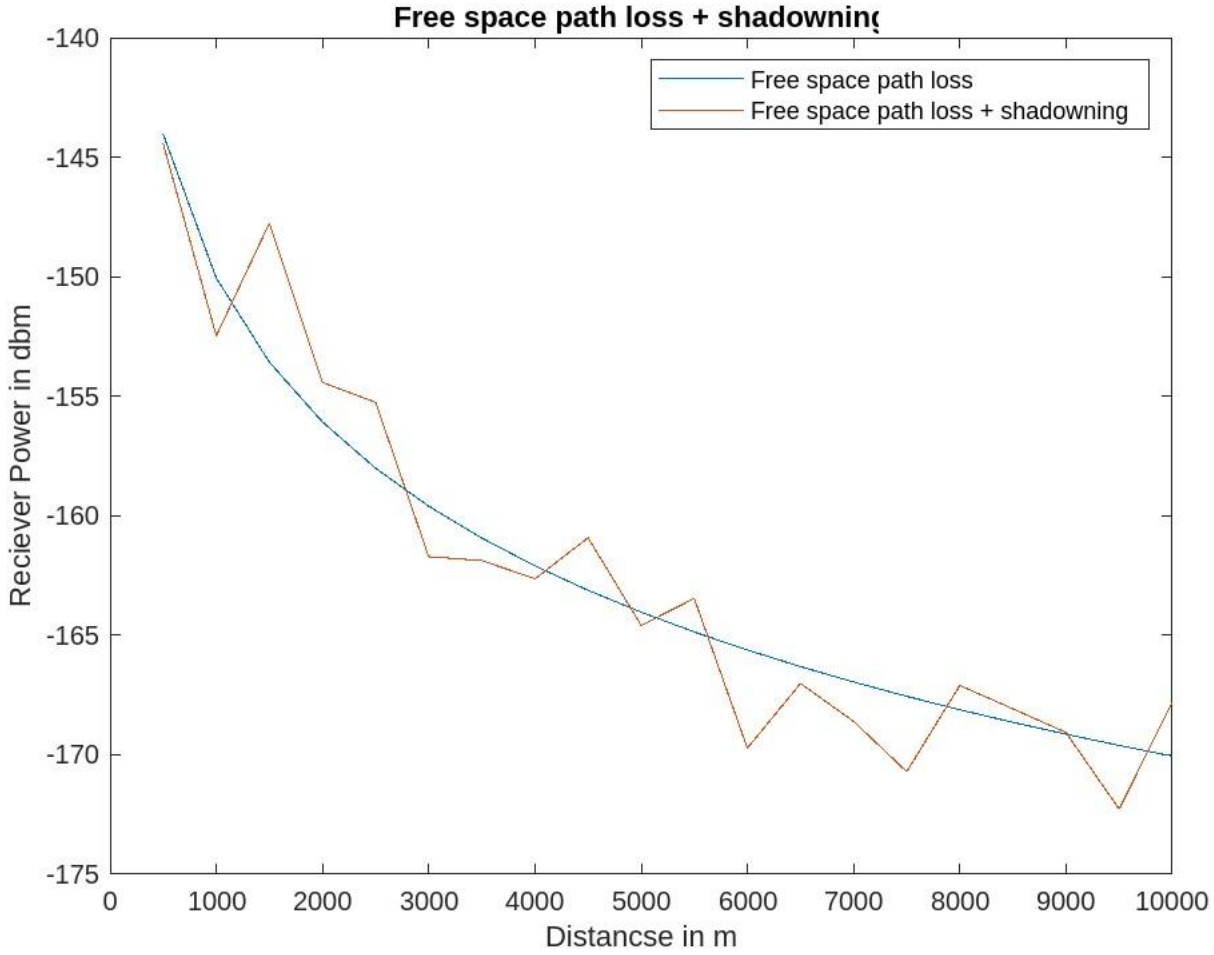
Simulation 1



Simulation 2



Simulation 3:



Observation :

- Free space path loss + shadowing simulation is performed using matlab and Receive power loss in dbm is plotted with shadowing vs distance in m