Karnataka Law Society's
GOGTE INSTITUTE OF TECHNOLOGY
Udyambag, Belgaum – 590008

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
(APPROVED BY AICTE, NEW DELHI)

Department of Electronics and Communications

CERTIFICATE

A report submitted in fulfillment of requirements for 6th semester B.E Course-Activity

Title: Simulation of 3-D Radiation Pattern of Dipole Antenna.

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Date:

Academic year 2019-2020 (Even Sem)

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Certified that the course-activity work entitled **"**Simulation of 3-D Radiation Pattern of Dipole Antenna**"** carried out by them

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1.	Punith Honnungar	2GI17EC088
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bonafide students of KLS Gogte Institute of Technology in partial fulfillment for the award of **Bachelor of Engineering** in **Electronics and Communication Engineering** of the Visvesvaraya Technological University, Belgaum during the year **2019-2020**. It is certified that all corrections/suggestions indicated for Internal Assessment have been approved as it satisfies the academic requirements in respect of subject course activity work prescribed for the said Degree.

Guide
(Prof S.M.Keshkamat)

Head of the Department
(Dr. Santosh S Saraf)

Acknowledgement

This subject course activity work consumed huge amount of work, research and dedication. The course activity would not have been possible if I did not have received support of many individuals and organizations for their incredible knowledge. Therefore I would like to extend my sincere gratitude to all of them. In particular, I would like to take this opportunity to express my honor, respect, deep gratitude & genuine regards to the staff of **KLS's Gogte Institute of Technology, Belagavi (Department of Electronics and Communication Engineering)** for providing me all the guidance required for my mini-project.

I sincerely would like to thank my guide **Prof S.M.Keshkamat for** guiding me throughout this course activity and also would like to thank my **Head of Dept Dr. Santosh. S. Saraf** for giving a platform to showcase my course activity.

My Sincere thanks to Principal, KLSGIT, Belagavi who have given me opportunity of doing this course activity.

Last but not the least I would like to thank all the people who have helped me directly and indirectly for making my course activity successful.

Contents

Aim: To write a program to plot 3-D Radiation Pattern of Dipole Antenna

Theory: In radio and telecommunications a **dipole antenna** or **doublet** is the simplest and most widely used class of antenna. The dipole is any one of a class of antennas producing a radiation pattern approximating that of an elementary electric dipole with a radiating structure supporting a line current so energized that the current has only one node at each end. A dipole antenna commonly consists of two identical conductive elements such as metal wires or rods. The driving current from the transmitter is applied, or for receiving antennas the output signal to the receiver is taken, between the two halves of the antenna. Each side of the feedline to the transmitter or receiver is connected to one of the conductors. This contrasts with a monopole antenna, which consists of a single rod or conductor with one side of the feedline connected to it, and the other side connected to some type of ground. A common example of a dipole is the "rabbit ears" television antenna found on broadcast television sets.

The dipole is the simplest type of antenna from a theoretical point of view. Most commonly it consists of two conductors of equal length oriented end-to-end with the feedline connected between them. Dipoles are frequently used as resonant antennas. If the feedpoint of such an antenna is shorted, then it will be able to resonate at a particular frequency, just like a guitar string that is plucked. Using the antenna at around that frequency is advantageous in terms of feedpoint impedance (and thus standing wave ratio), so its length is determined by the intended wavelength (or frequency) of operation. The most commonly used is the center-fed **half-wave dipole** which is just under a half-wavelength long. The radiation pattern of the half-wave dipole is maximum perpendicular to the conductor, falling to zero in the axial direction, thus implementing an omnidirectional antenna if installed vertically, or (more commonly) a weakly directional antenna if horizontal.

Code:

```
% Name: RadPattern3D
% Description: 3-D Radiation Pattern of Dipole Antenna
% Reference Constantine A.Balanis, Antenna Theory
% Analysis And Design , 3rd Edition, page 173, eq. 4-64
%**********************************************************
%Usage:
%This program plots 3-D radiation Pattern of a Dipole Antenna
%All the parameters are entered in the M-File
clear all
%Defining variables in spherical coordinates
theta=[0:0.12:2*pi];%theta vector
phi=[0:0.12:2*pi];%phi vector
l_lamda1=1/100;% length of antenna in terms of wavelengths
I0=1;% max current in antenna structure
n=120*pi;%eta
% evaluating radiation intensity(U)
U1=( n*( I0^2 )*( ( cos(l_lamda1*cos(theta-(pi/2))/2) -
cos(l_lamda1/2) )./ sin(theta-(pi/2)) ).^2 )/(8*(pi)^2);
%converting to dB scale
U1_1=10*log10(U1);
%normalizing in order to make U vector positive
min1=min(U1_1);
U=U1_1-min1;
% expanding theta to span entire space
U(1,1)=0;
for n=1:length(phi)
theta(n,:)=theta(1,:);
end
% expanding phi to span entire space
phi=phi';
for m=1:length(phi)
phi(:,m)=phi(:,1);
```

```
end
% expanding U to span entire space
for k=1:length(U)
U(k,:)=U(1,:);
end

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% converting to spherical coordinates
[x,y,z]=sph2cart(phi,theta,U);
%plotting routine
surf(x,y,z)
%%%%%%%%%%%%%%%%%%%%%%%
```
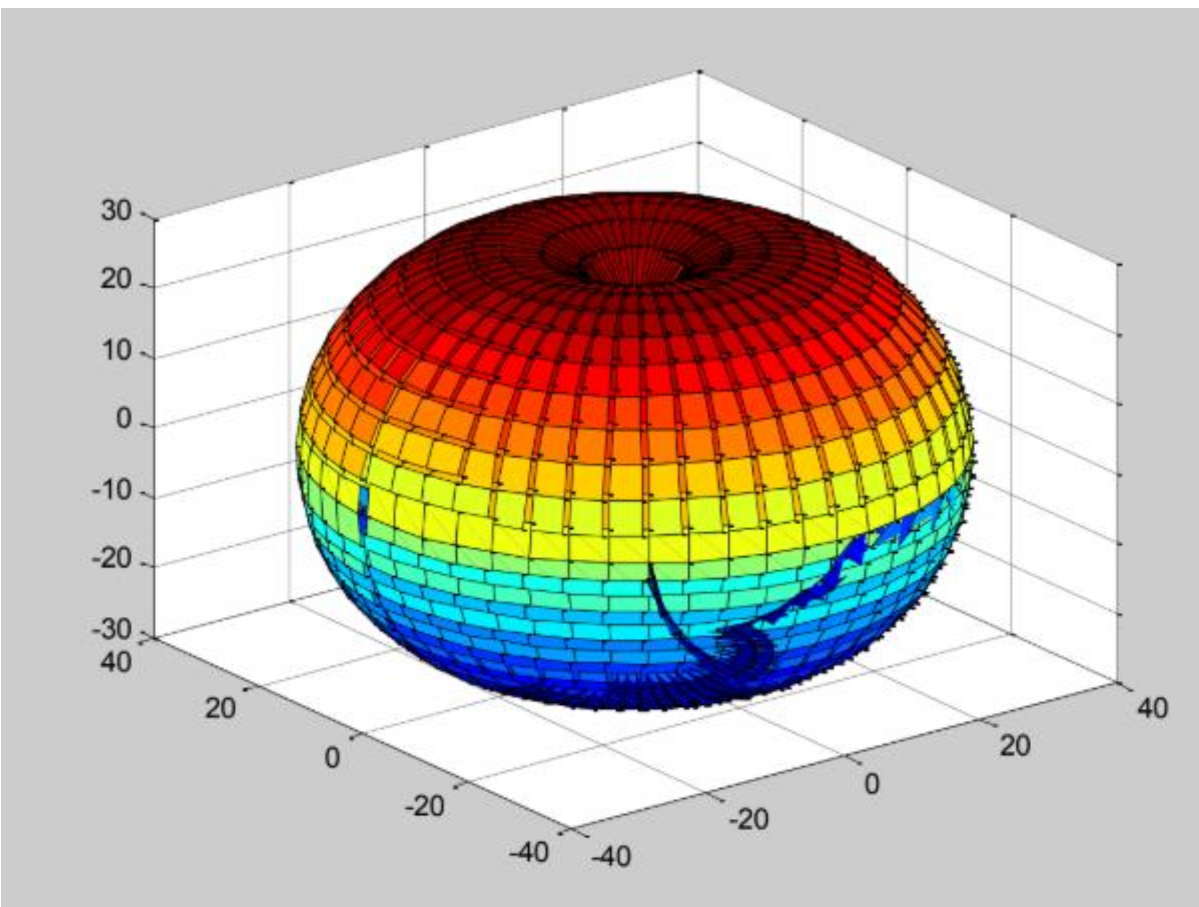

OUTPUT:



Conclusion:

The radiation patterns are impacted by the length. Here we consider length as fractions or multiples of the wavelength at the desired frequency. Lower the frequency, longer the wavelength, and thus longer the antenna.

The dipole with a very thin radius is considered. The dipole Antenna is similar to the short dipole except it is not required to be small compared to the wavelength

The full-wavelength dipole antenna is more directional than the shorter quarter-wavelength dipole antenna. This is a typical result in antenna theory: it takes a larger antenna in general to increase directivity. The pattern is similar to the pattern for the quarter- and half-wave dipole antenna.