

## Study of the Mesh Field and Rotation in Various Planes of Optical Spherical Nano Antenna

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**ABSTRACT:** Present research is a study of spherical optical nano antenna for the better understanding of its performance. The quality of the performance of antennas is measured to account the rotation of the antenna in various plane and and mesh (network) field. In this research the performance of antenna is qualitative analyze with the help of mesh field analysis and three dimension polarization pattern.

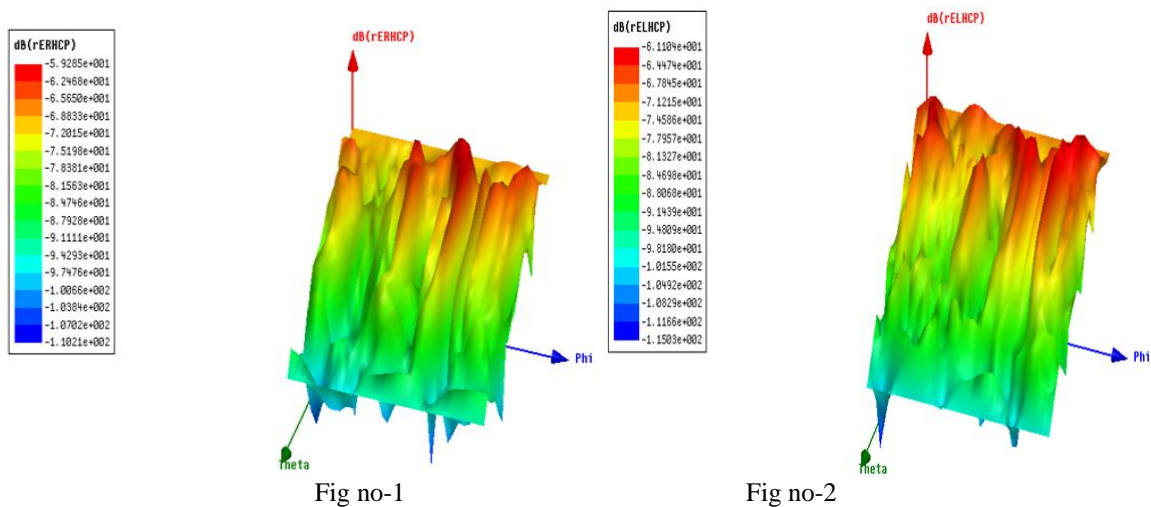
**Key words:** mesh field, polarization.

### I. INTRODUCTION

The expansion of the world of the ‘science and technology’ making drastic change in many aspects. Nano antenna is an important segment of it. Spherical optical Nano - antenna is designed by a single nano sphere and dielectric rectangular space. These gold nano sphere and dielectric rectangular space separated by 1nm vacuum space. The vacuum space confined the electromagnetic wave which generates electronic wave known as wave Plasmon. The performance of this spherical optical nano antenna analyses by mesh analysis of Electric field ,Magnetic field ,current density and three dimensional RHCP and LHCP polarization pattern for far field and near field.

### II. ANALYSIS OF THREE DIMENTION POLARIZATION

MEASUREMENT OF THE DIMENSION POLARIZATION PATTERNS FOR NEAR FIELD: Three dimension polarization pattern of antenna can measure in transmission or received mode. This pattern gives the measurement of the variation of elevation ( $\theta$  and  $\phi$ ) with fixed frequency or variation of frequency with fixed elevation (and  $\phi$ ) for near field .To achieve the desired pattern cuts for mounting the structure of the system must have capability to rotate in various planes .This can be accomplished by varying different types of position as elevation-over -azimuth or azimuth-over- elevation .The three dimension polarization of spherical optical nano antenna is measured in figure no -1&2 for RHCP and LHCP. This result of three dimension polarization pattern gives specific polarization pattern cuts that reflects azimuth –over- elevation with sharp slope Swich provides capability of spherical nano antenna to rotate in various plane.



### III. Three Dimention LHCP Pollarization Patter For Far Field

Three dimensions LHCP and RHCP polarization pattern for far field is measured in figure no 3& 4. The study of radiation pattern shows the azimuth –over - elevation plane of radiation. This plane defines the capability of spherical nano antenna can place in varies direction with  $\theta$  and  $\phi$  is given bellow-

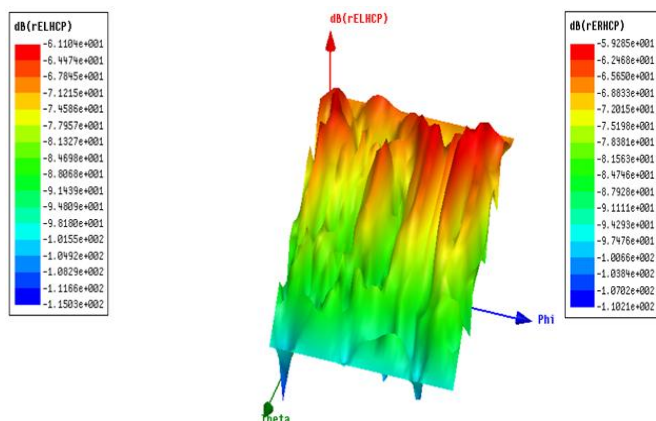


Fig no-3

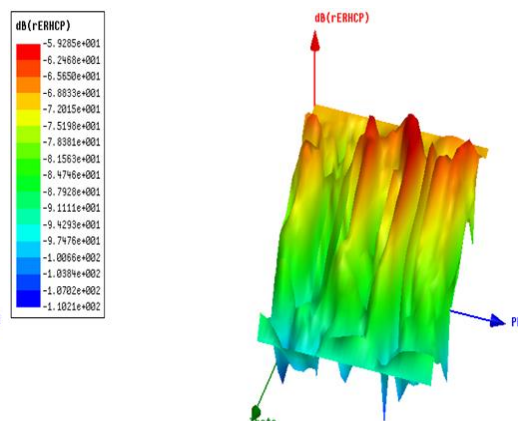


Fig no-4

#### IV. MESH ANALYSIS

Mesh analysis is a measurement of the possible large field enhancement of plasmonic resonance. The enhanced field of spherical optical nano antenna for near to the outer surface and small (1nm) space between gold sphere and rectangular space of dielectric material of plasmonic optical nano antenna is at the frequency 445THz. The qualitative and quantitative measurement of plasmonic resonance of Electric field, Magnetic field and current density at frequency 445THz which gives the idea about the performance optical nano antenna and visualization of its pointing vector field.

#### V. MESH OF ELECTRIC FIELD

The mesh of electric field of spherical optical nano antenna is shown in fig-5. The formation of mesh of electric fields is tetrahedral with corner sharing tetrahedral at frequency 415THz to 445THz. The result of mesh analysis gives red colour for the maximum value of electric field and blue colour for the minimum value of electric field.

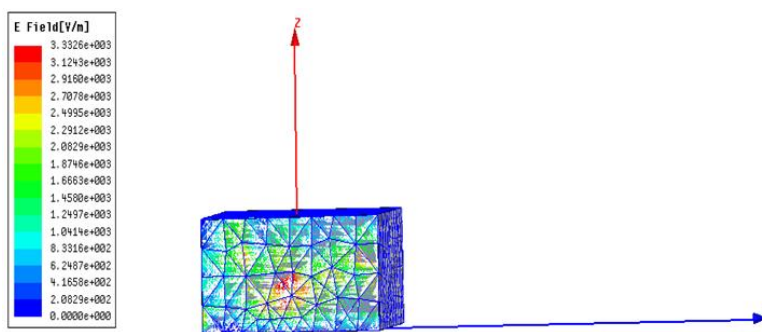


Fig no-5

#### VI. MESH OF MAGNETIC FIELD

The mesh plot is visualization of transmitting or receiving magnetic field of spherical optical nano antenna in fig. 6. The result magnetic mesh analysis shows dark orange colour is maximum value of magnetic field and blue colour is the minimum value of magnetic field and geometry of mesh are tetrahedral. The value of magnetic field lines from  $2.9738e + 001$  to  $8.72424e -001$ .

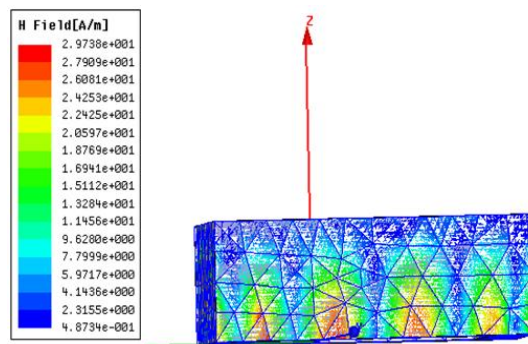


Fig-6

The mesh analysis of surface current density of the outer surface of spherical optical nano antenna is in fig no. 7. These meshes are tetrahedral. The red colour is maximum value surface current density and blue colour is minimum value of surface current density. The value of surface current density lie 2.2424e +001 to 6.882e -002.

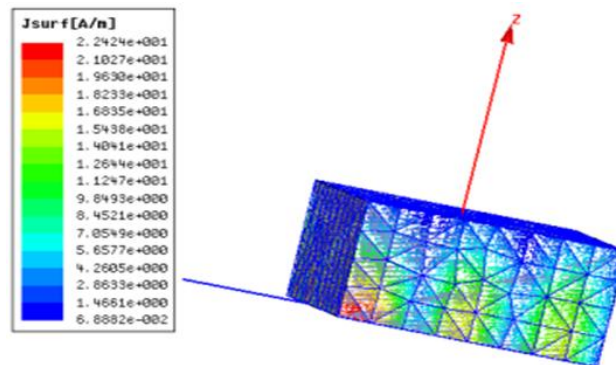


Fig no 7

## VII. CONCLUSION

The present research shows the domain of field is large and variation in elevation and azimuth planes are not sharp. This result gives the significant cuts of polarization pattern which reflects more capability of rotation of antenna in the region of field at frequency 445THz .The mesh analysis gives outer surface field of rectangular dielectric space enhancement in electric field, magnetic field and current density.

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