

# SUMMARY

## What is Magnetic dipole:-

A model of an object that generates a magnetic field in which the field is considered to emanate from two opposite poles, as in the north and south poles of a magnet, such as an electric field emanates from a positive and a negative charge in an electric dipole.

## Magnetic field due to a magnetic dipole:-

at a distance  $(r \gg d)$ , this is 2D field having X and Z component

$$B_x = k \cdot m \cdot (3 \cdot x x \cdot z z) / (r r.^5)$$

$$B_z = k \cdot m \cdot (3 \cdot z z.^2 / r r.^5 - 1 / r r.^3)$$

$$\text{And } B = \sqrt{B_x.^2 + B_z.^2}$$

By the above formulas we calculate magnetic field due to a dipole.

Then we plot the field lines using two plots

1) Quiver

$$h = \text{quiver}(x, z, u, v);$$

2) Streamslice

$$l = \text{streamslice}(x, z, u, v)$$

1) We have used magneticDipole2d function to initialise and compute components of magnetic field to plot them.

2) We also use circle function to effectively show the magnetic dipole in circular form(as it is very small to consider).

Then we use app designer to lay out design of our GUI and to make external input for different values of q,R,ur,d to get quiver plot, streamslice plot and both.