



INDIAN INSTITUTE OF INFORMATION TECHNOLOGY,
DESIGN AND MANUFACTURING,
KANCHEEPURAM

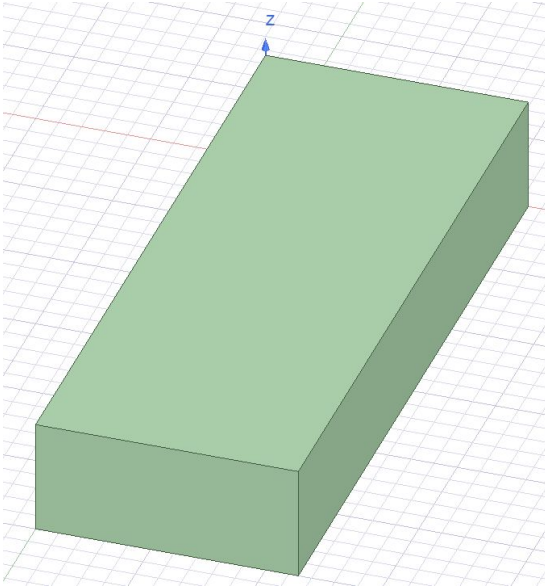
RFMCD PRACTICE LAB 5

NAME : K.NITHESH
ROLL NO : ESD19I008

AIM : To observe signal propagation in a X-band rectangular waveguide

Tools Required : HFSS(ANSYS ELECTROMAGNETIC DESKTOP)

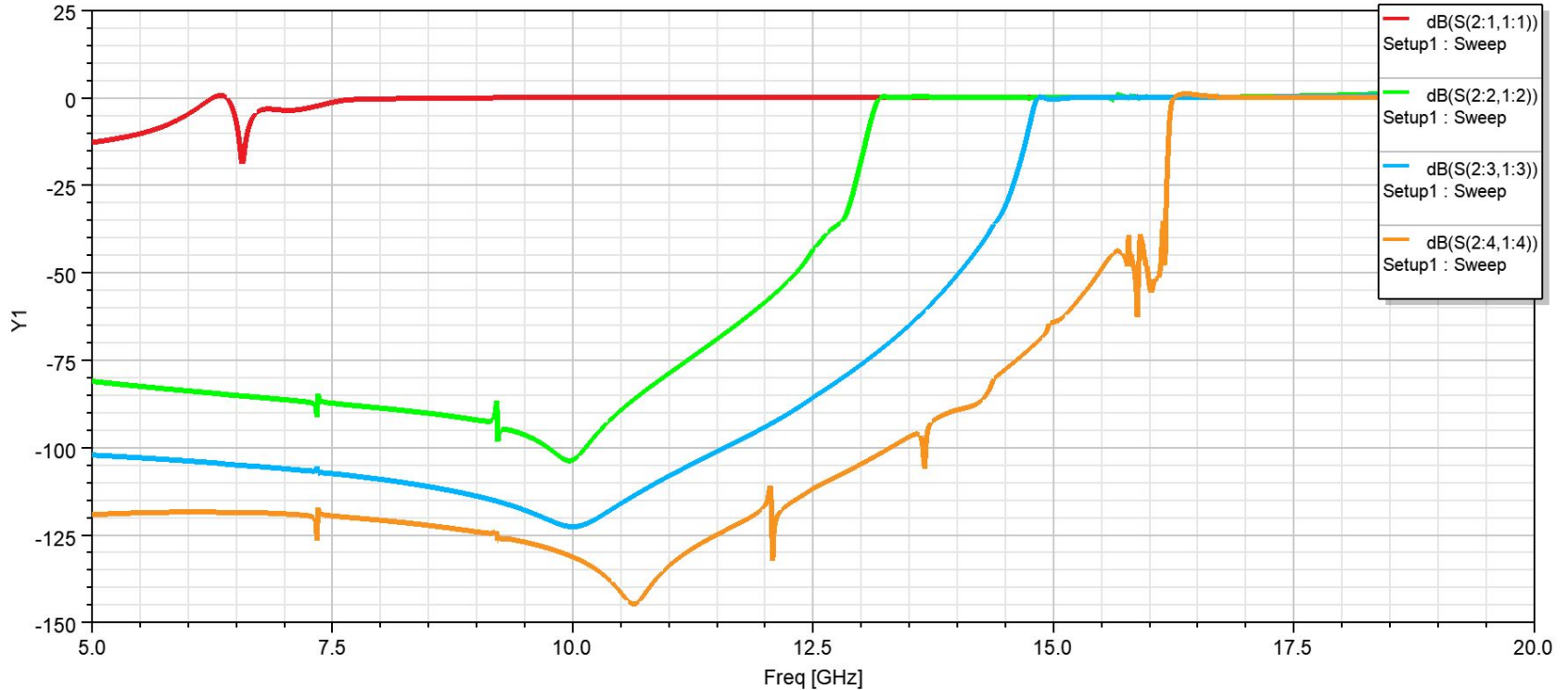
Waveguide design :



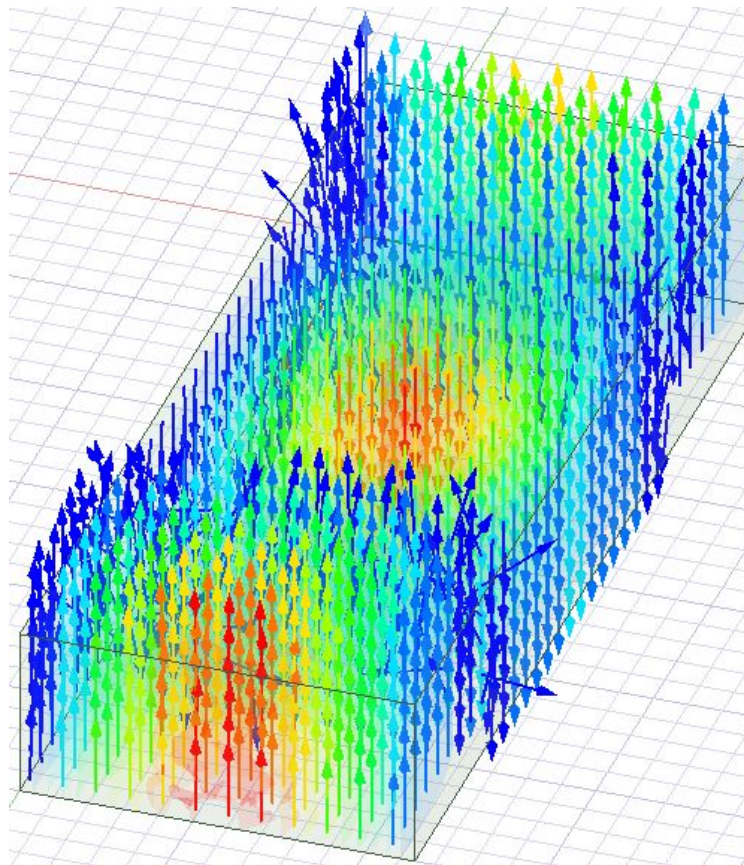
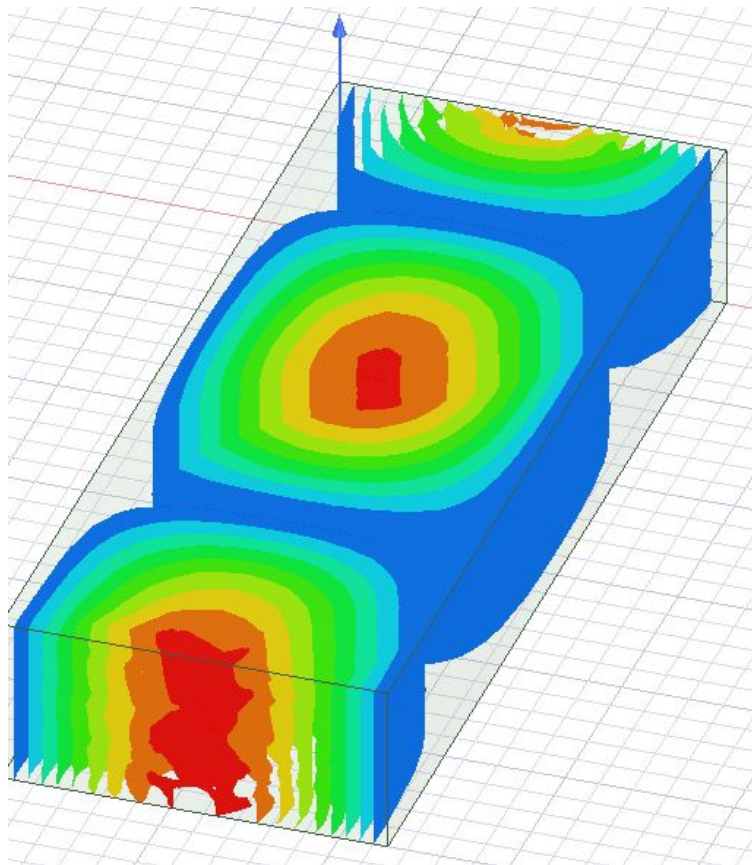
S parameters plot:

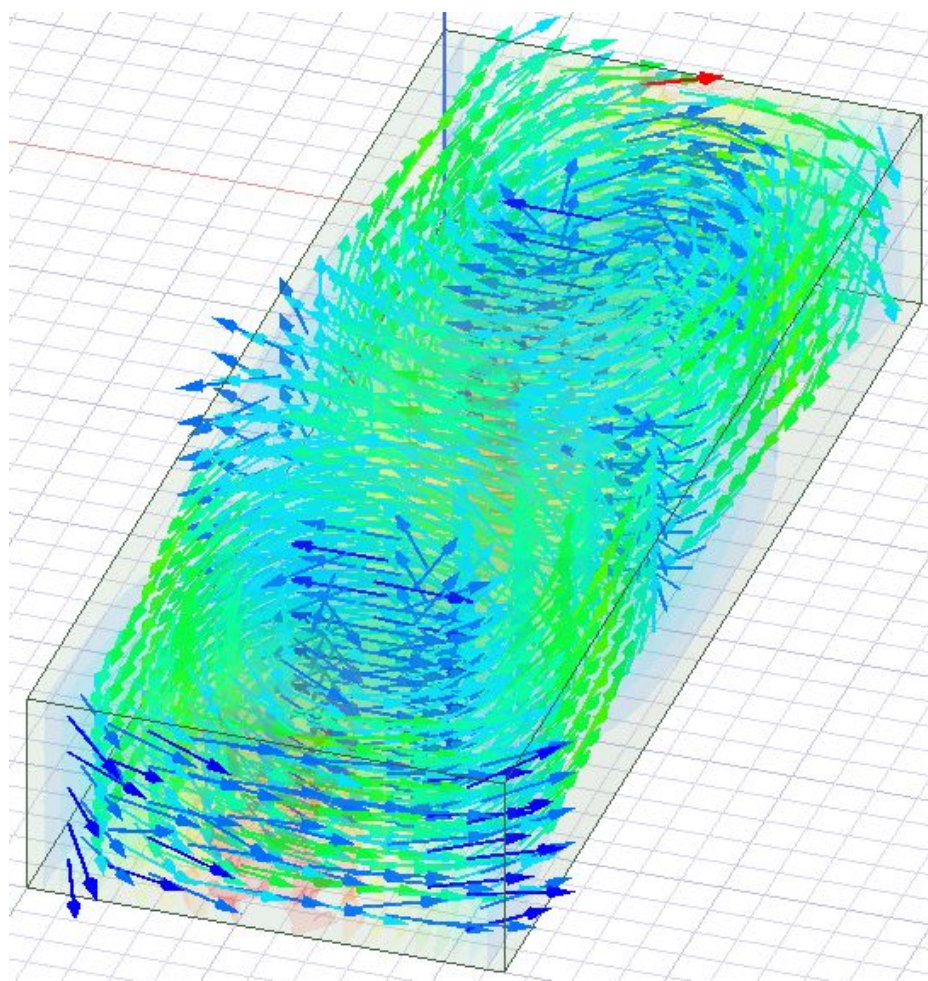
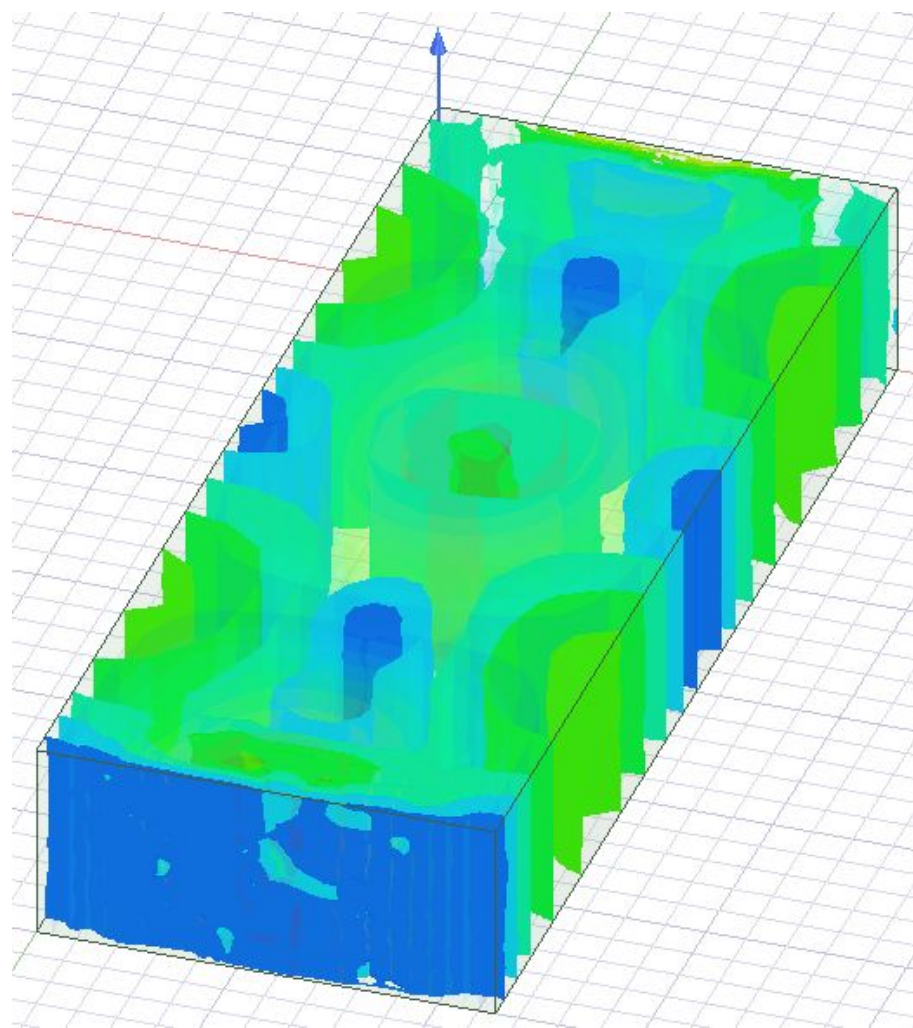
S Parameter Plot 1

HFSSDesign1
2022 R2
STUDENT

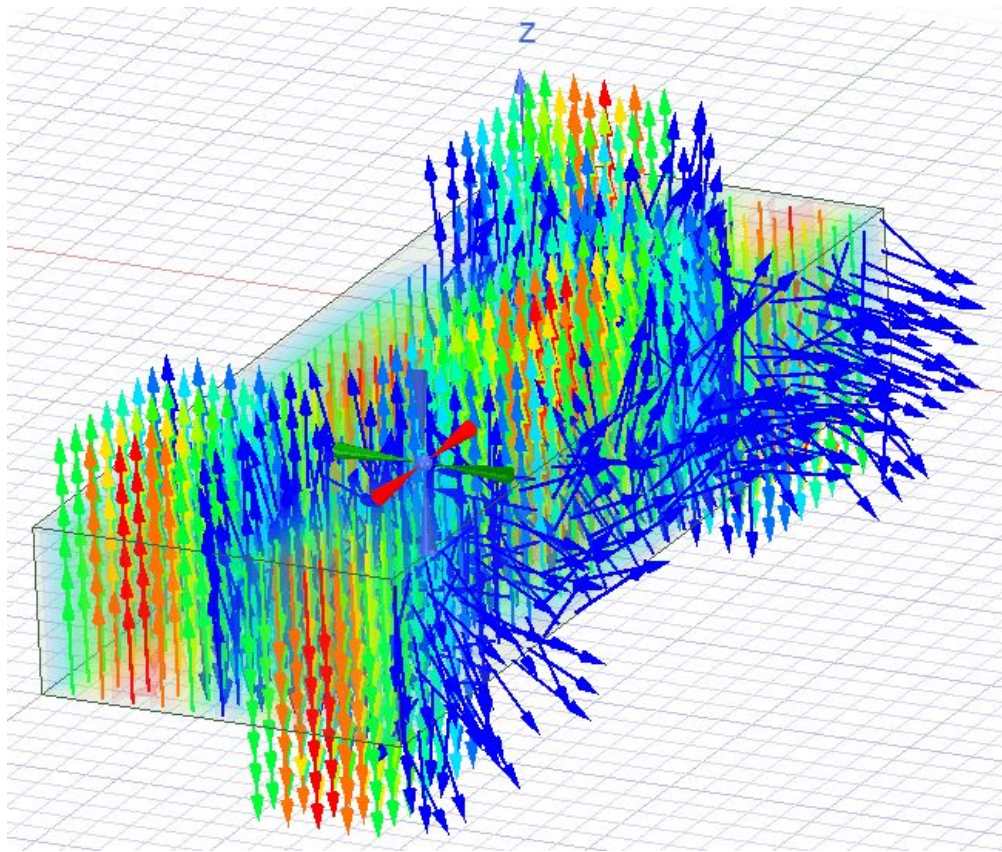
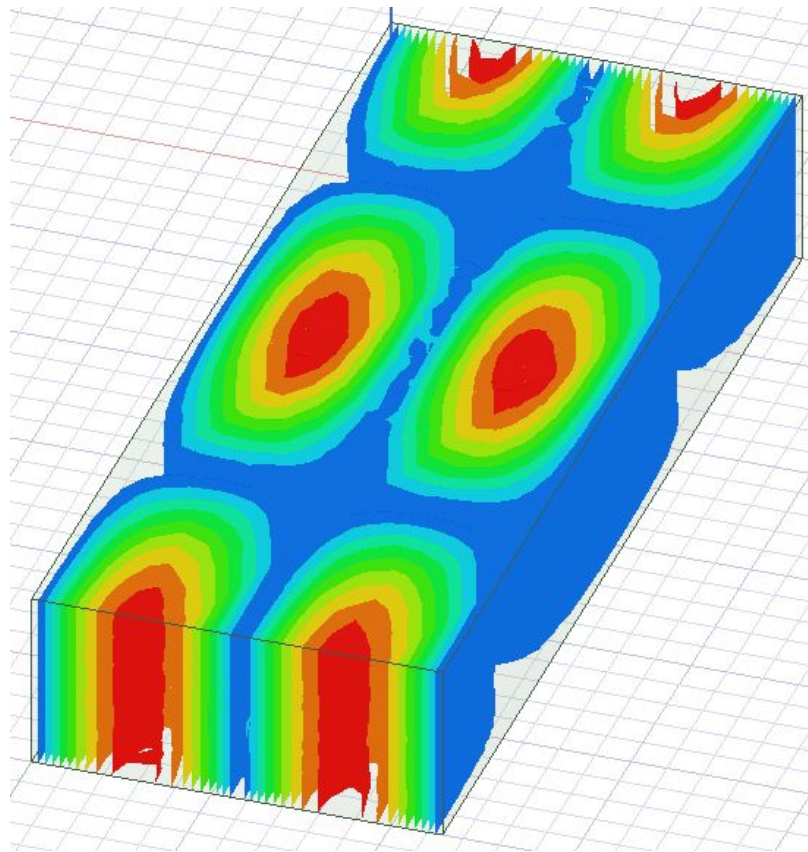


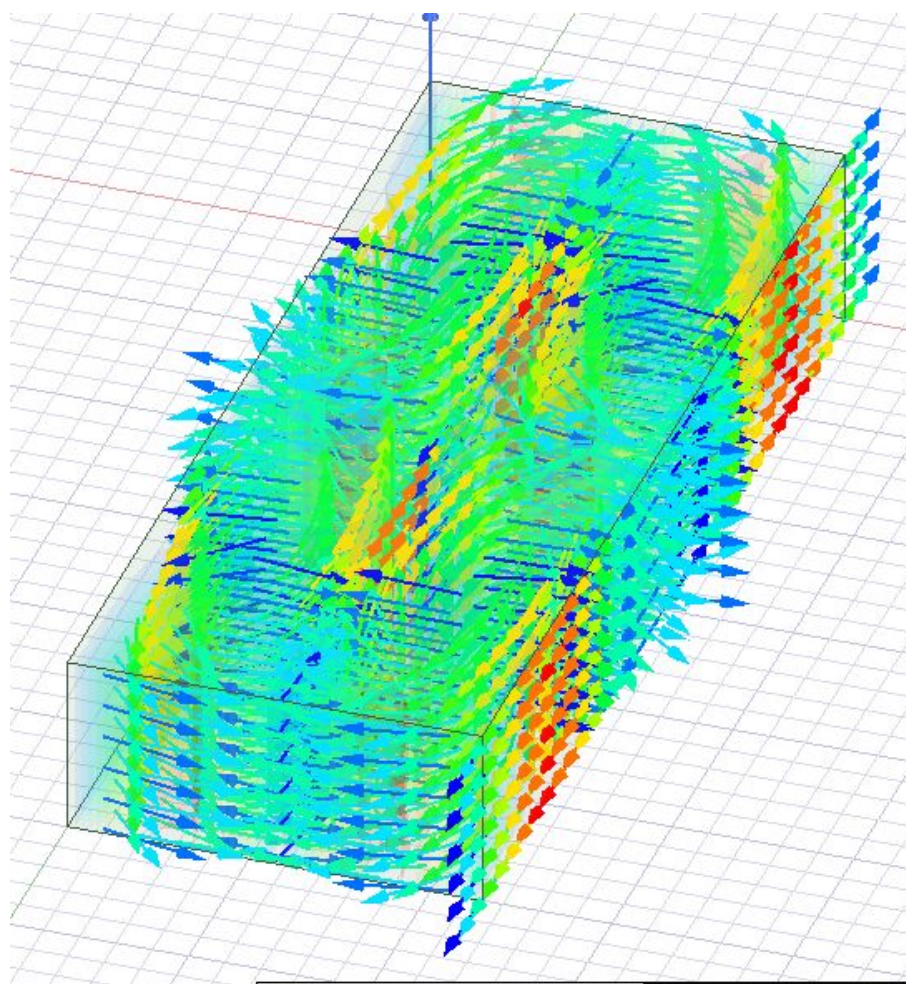
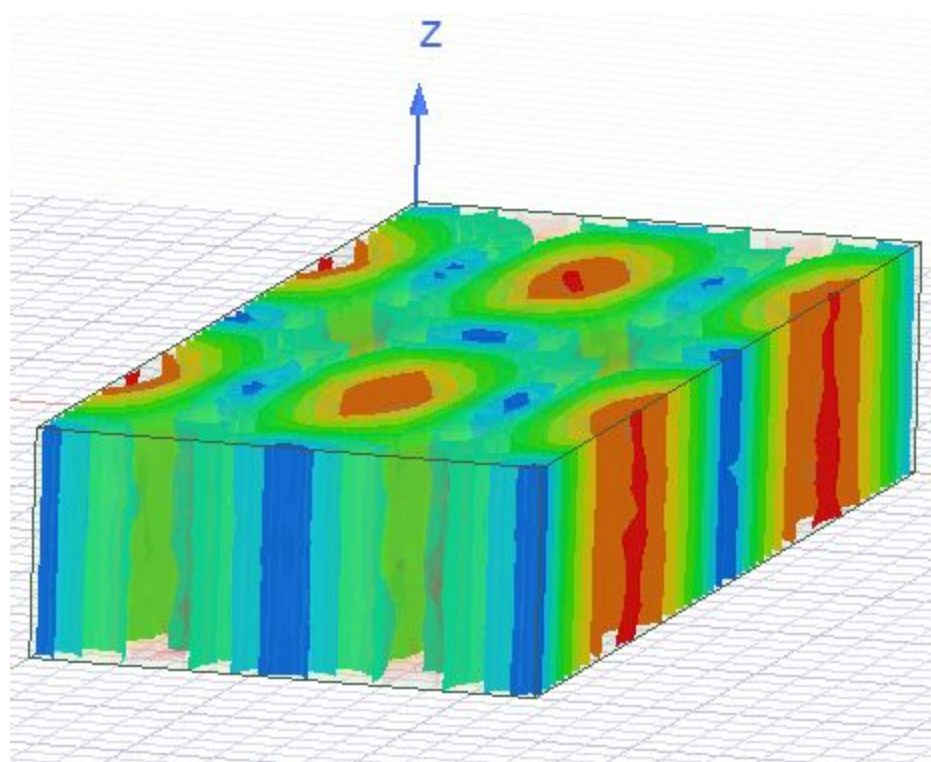
TE10 MODE :



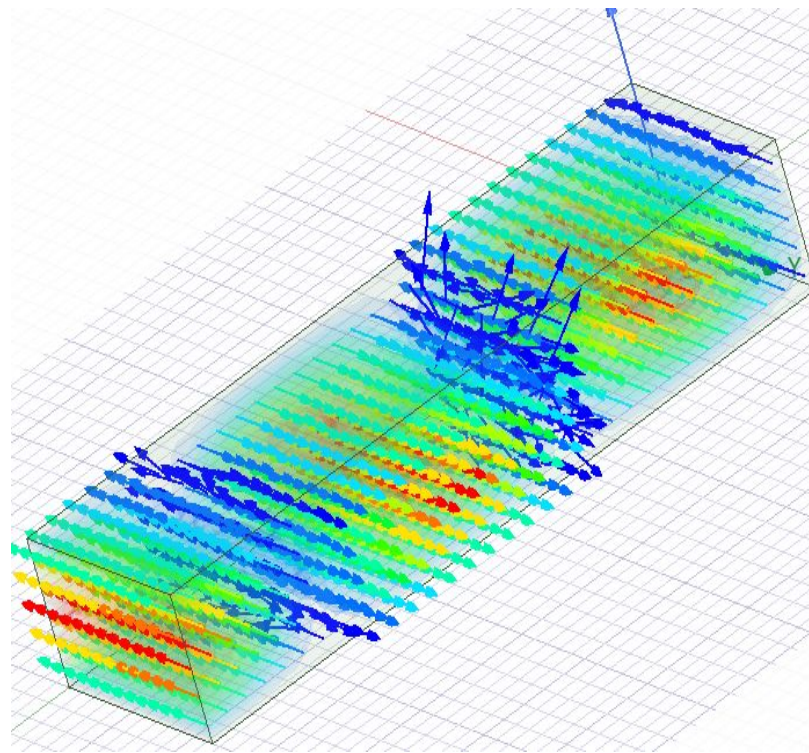
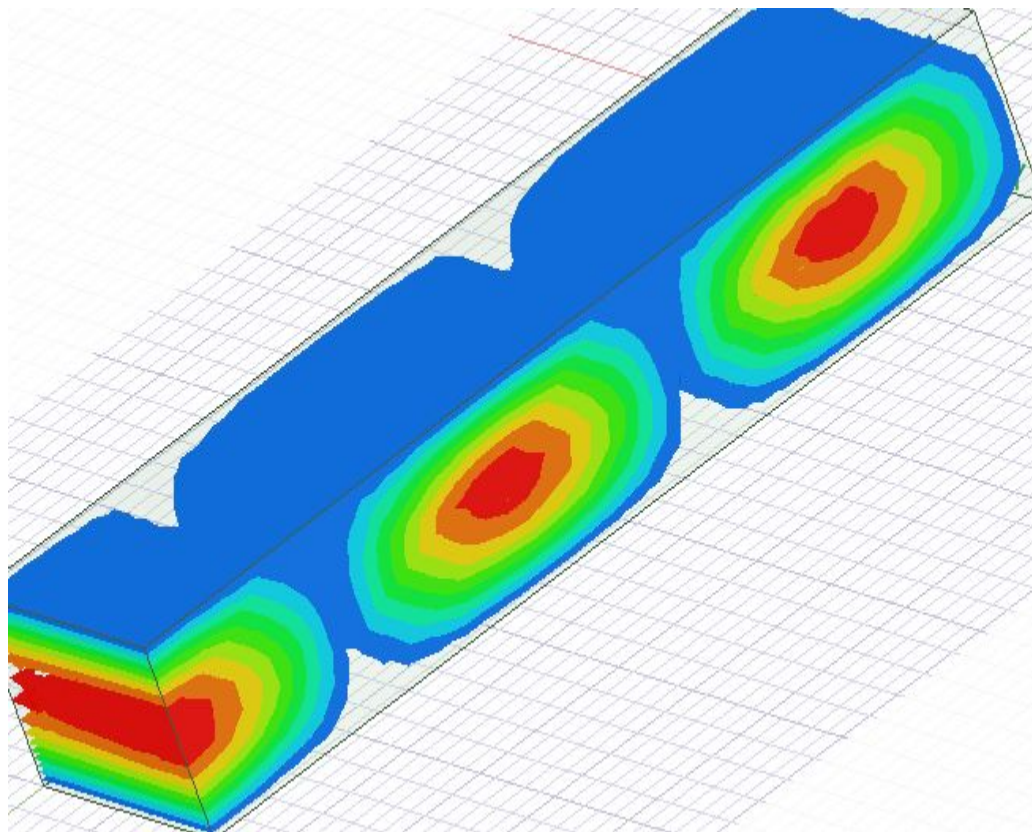


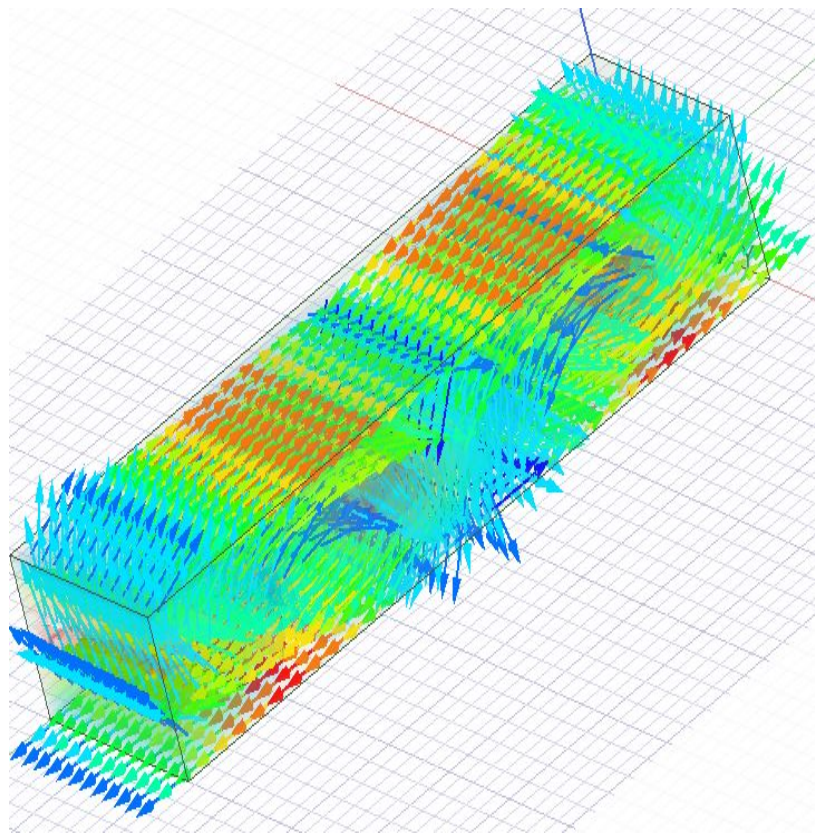
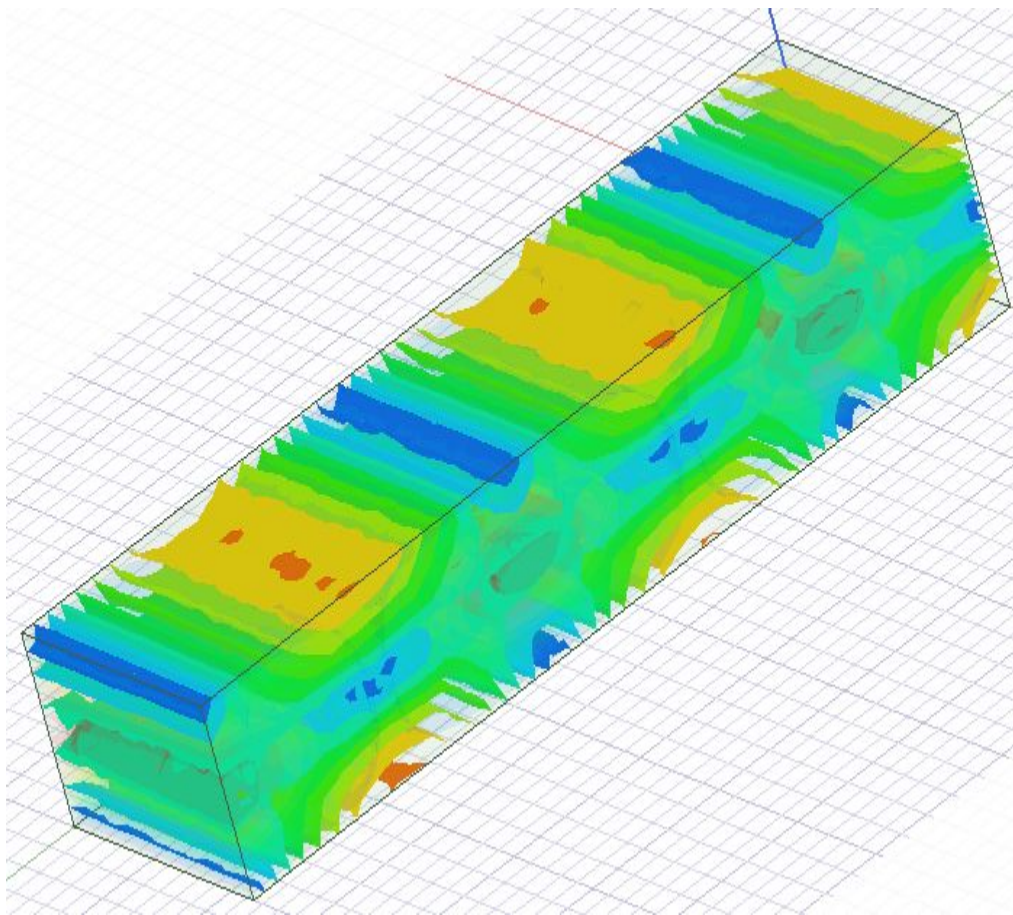
TE₂₀ MODE:



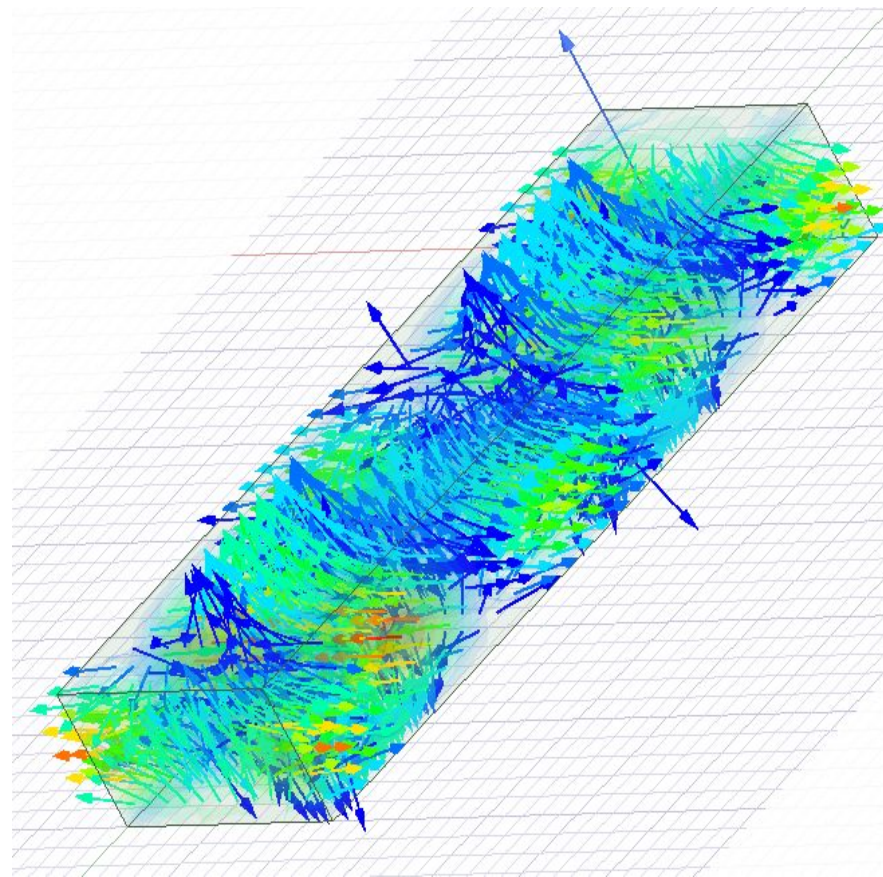
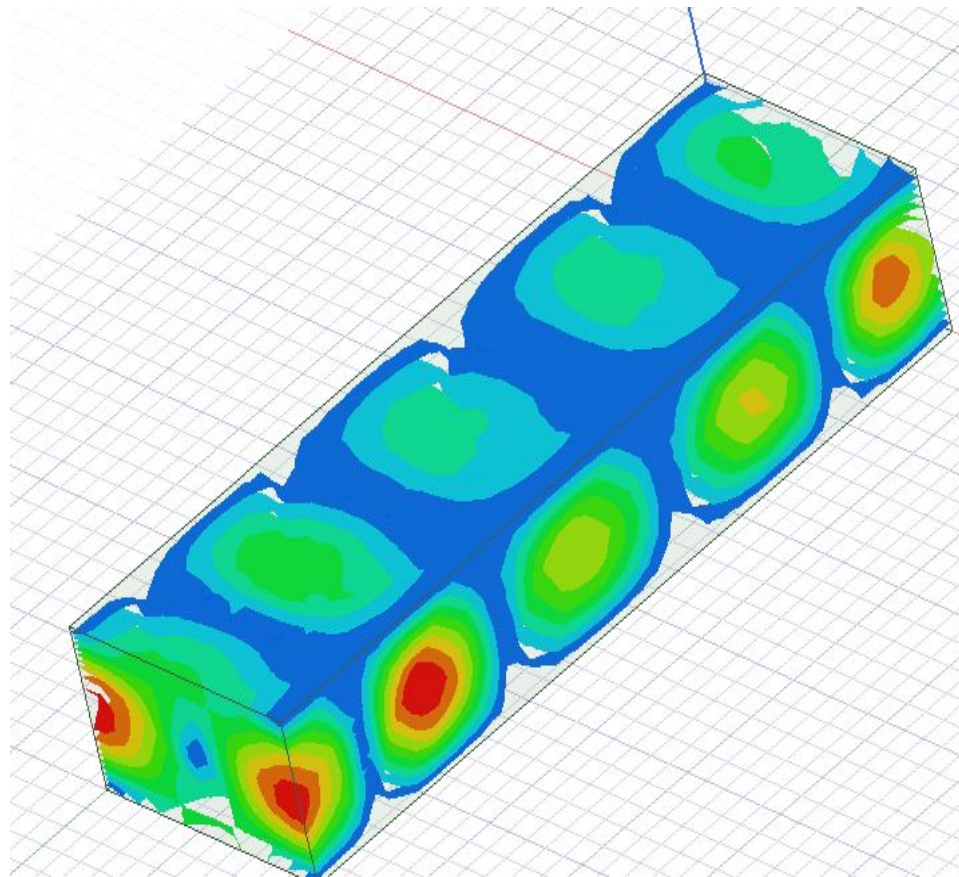


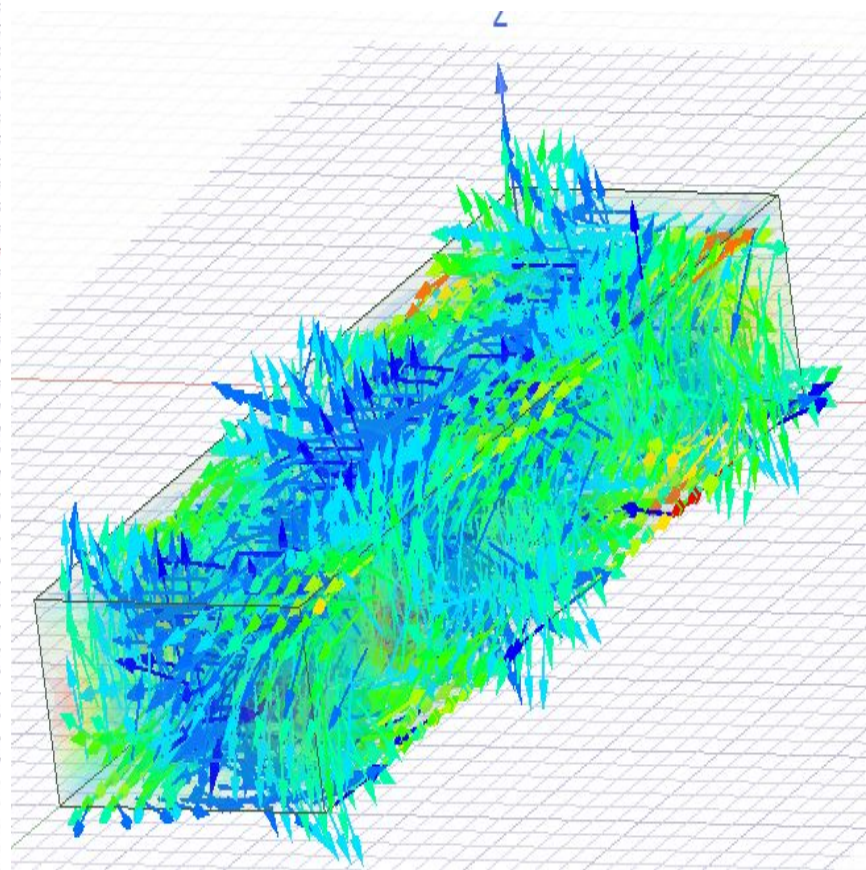
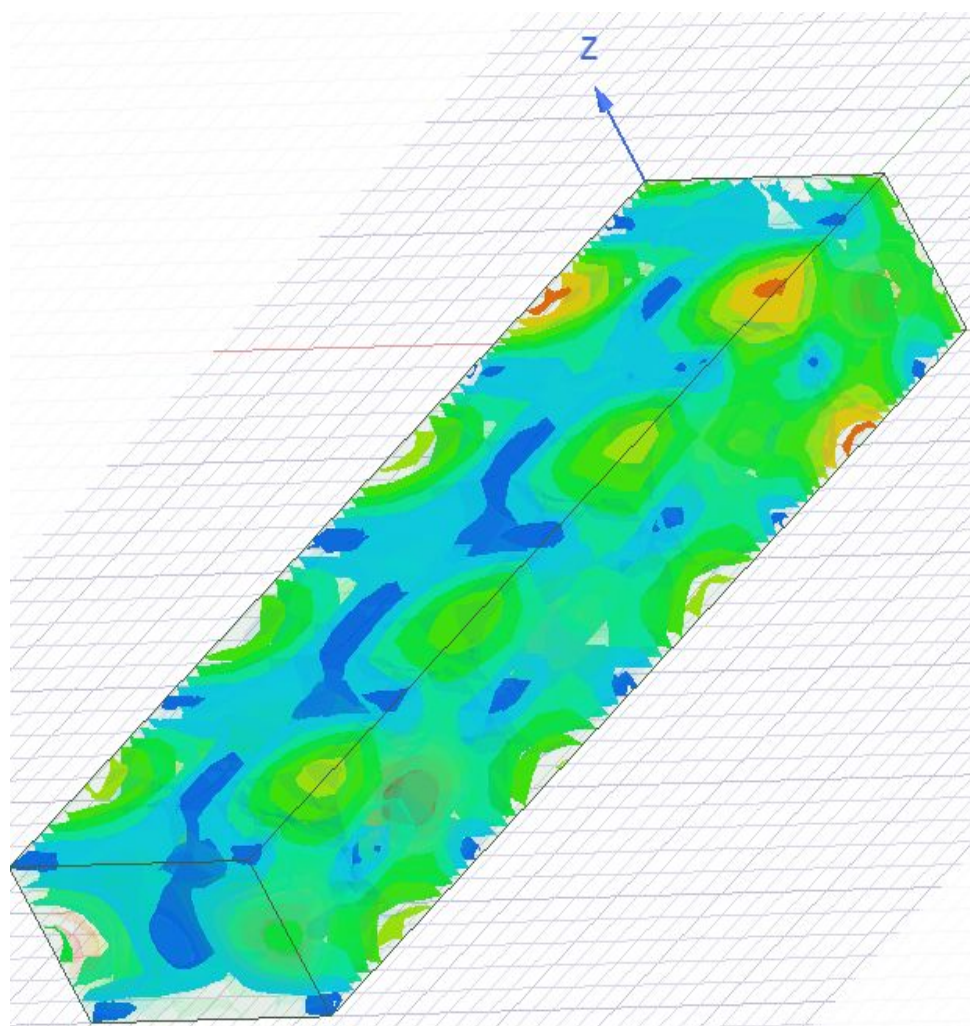
TE01 MODE:





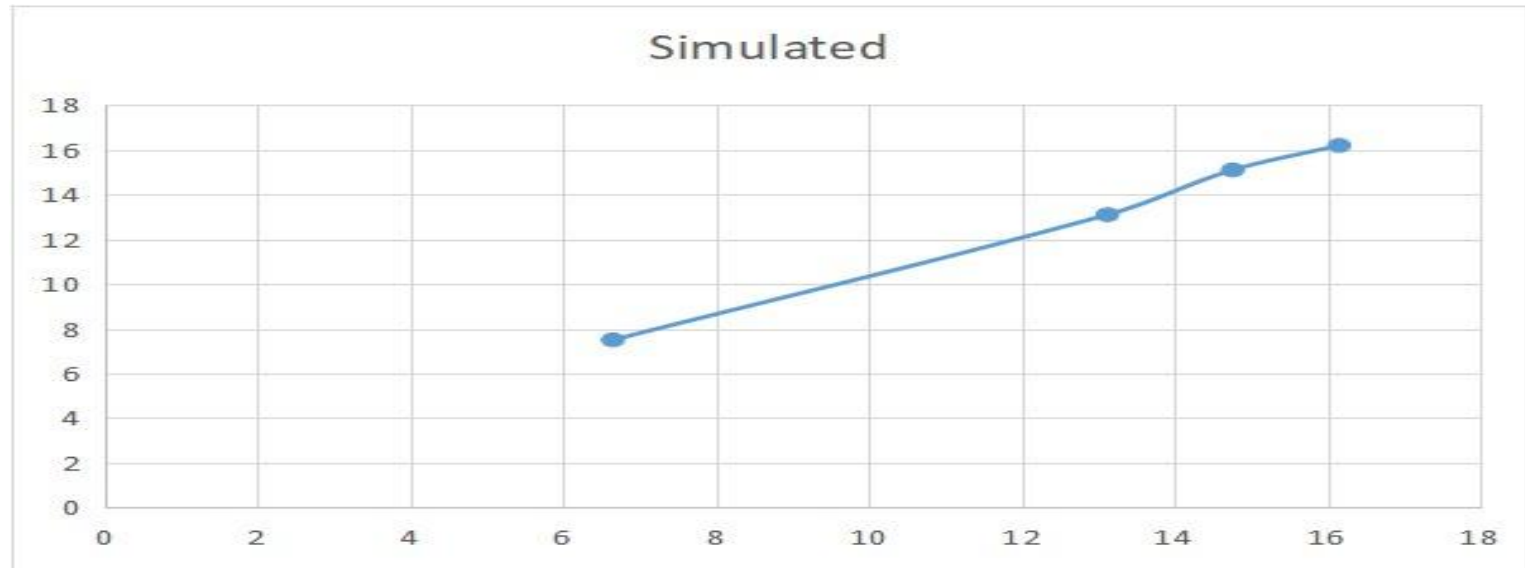
TE₁₁ MODE:





ACTIVITY 2 :Calculate cutoff frequency of all the 4 modes and compare simulated vs calculated frequency plot.

mode	Calulated	Simulated
10	6.651	7.5
20	13.1233	13.1
o1	14.763	15.1
11	16.1562	16.2



INFERENCE:

- By observing the vector field we can identify the direction of propagation.
- If we take frequency less than cutoff frequency it will not propagate from one port to another port in waveguide.
- By observing the S parameter plot we can identify the cutoff frequency.
- By observing the shape of propagation we can identify the mode of propagation.
- TE modes (Transverse Electric) have no electric field component in the direction of propagation
- TM modes (Transverse Magnetic) have no magnetic field component in the direction of propagation.
- all the modes meet at 0 and form a straight line when they reach cut-off frequency

Conclusion:

Signal propagation on the rectangular waveguide is observed after the rectangular waveguide has been created using Ansys software. Then, we observed the s-parameter. Observed different modes of propagation.