

ANTENNAS AND WAVE PROPAGATION

LAB ASSIGNMENT 2

EXPERIMENT 2

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AIM: Obtain the plots for Return Loss and VSWR for the 2.4 GHz Micro Strip Antenna.

Theory: In this experiment we will be plotting a graph between the Return Loss and VSWR of the Micro Strip Antenna resonating at 2.4 GHz . This plot can be used to check the efficiency of the Antenna radiation.

The method to measure an antenna's ability to accept power is VSWR (voltage standing wave ratio). VSWR evaluates the ratio of the peak amplitude of the voltage of the wave on the transmission line versus the minimum amplitude of the voltage of the wave. A VSWR of 1 is ideal; this indicates that there is no reflected power at the antenna port.

$$VSWR = \frac{1 + |\Gamma|}{1 - |\Gamma|}$$

Return Loss is a measure in relative terms of the power of the signal reflected by a discontinuity in a transmission line or optical fiber. This discontinuity can be caused by a mismatch between the termination or load connected to the line and the characteristic impedance of the line. It is given by

$$\text{Return Loss} = -\Gamma_{dB}$$

Software Specifications:

Operating System: Windows 10 Virtual Machine OS

Software: HFSS Version 13

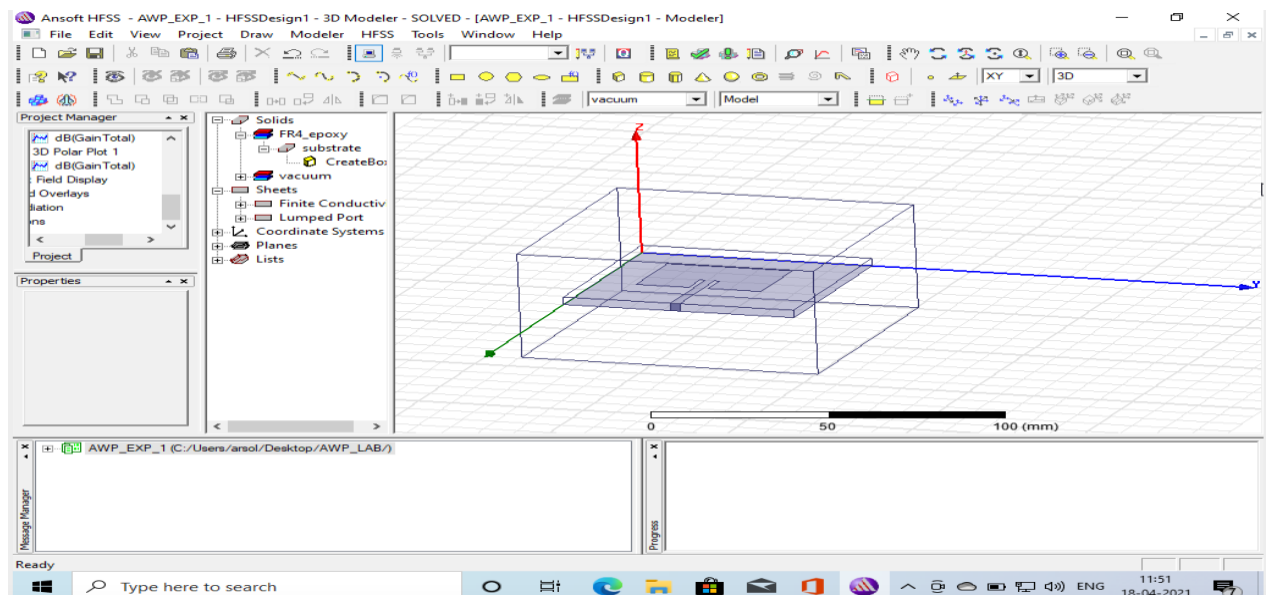
KIT: Antenna Design Kit

Procedure:

Same design as Experiment 1 Continued:

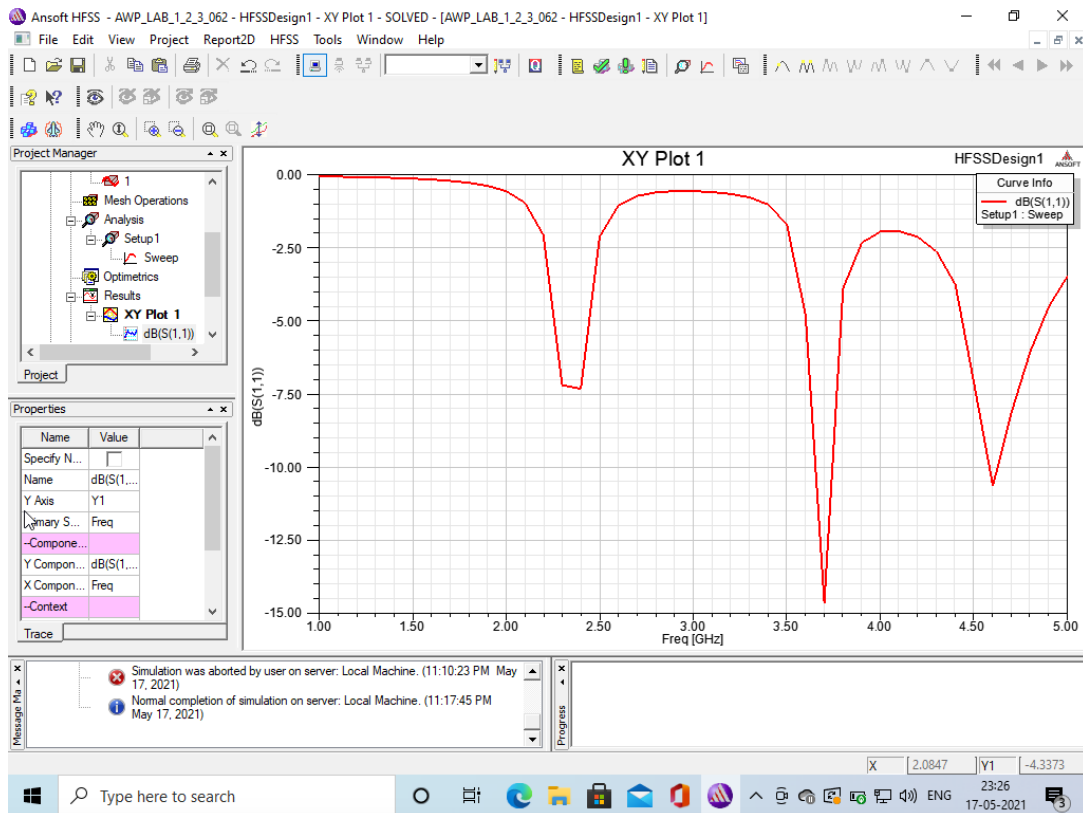
1. After designing the Antenna and Running the Analyse all commands. Go to the file menu under HFSS
2. Click on Create Terminal Data Report under the Results Option to plot a rectangular plot.
3. Set the specifications as Terminal VSWR parameter and the function as Db.
4. You will get your required plot.

Micro Strip Patch Antenna Design resonating at 2.4 GHz.

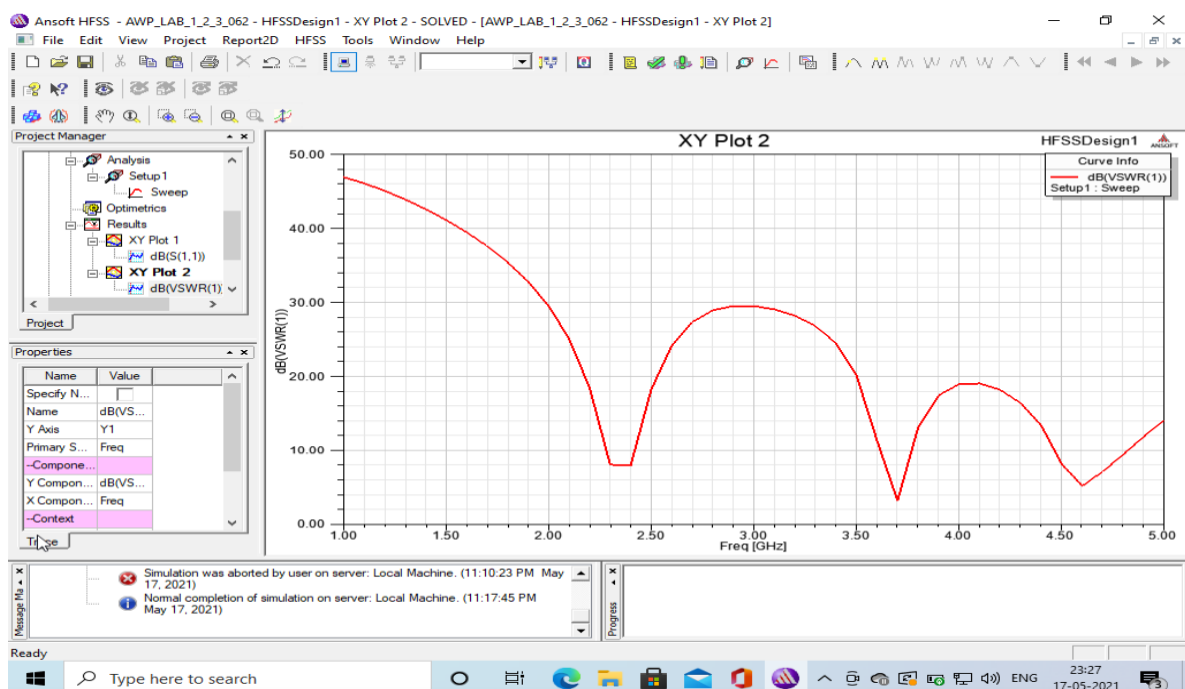


FINAL OUTPUT OF THE EXPERIMENT:

- Graph for Return Loss



- Graph for VSWR



Return Loss in the graph can be said to be 30 dB.

CONCLUSION: In this experiment we have learnt how to plot a graph between Return Loss and VSWR. Bandwidth (sometimes just referred to as impedance bandwidth) refers to the range of frequencies a given Return Loss can be maintained. Since Return Loss is a measurement of how much power the antenna accepts from the transmission line, the impedance of the antenna must match the impedance of the transmission line for maximum power transfer. However the impedance of the antenna changes with frequency, resulting in a limited range that the antenna can be matched to the transmission line. The Bandwidth is a measure of this range. It is typically paired with a given Return Loss or VSWR value. This plot can be used to check the efficiency of the Antenna radiation.