

The following design was made for the GMRT(Giant Meterwave Radio Telescope) taking into account the prime-focus parabolic reflectors of 45m diameter that are spread over distances of up to 25 km. The antennas have a focal length of 18.54m and a half subtended angle of 62.5° . The scope of my work was to design the horn and the associated feed system, and calculate the theoretical performance of the GMRT antennas over these two frequency bands.

The design can certainly be improved especially for the lowest band and further improvements shall be published in this document

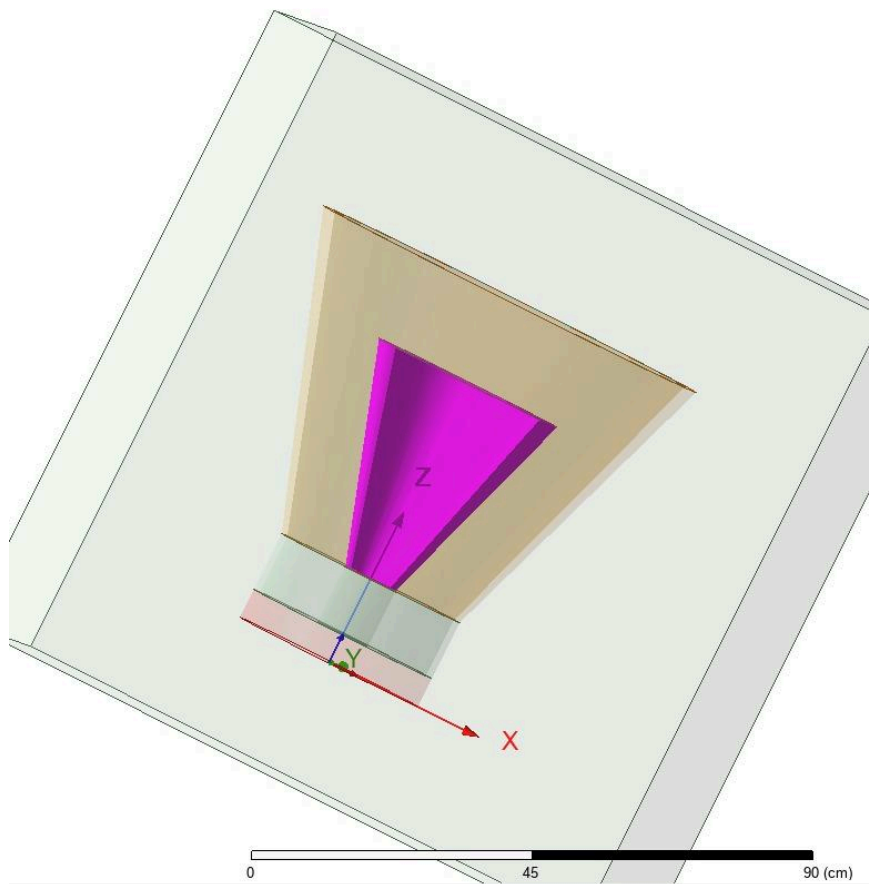


Fig 1.1 The above design shows the antenna 2D view. The inner horn is for receiving 1-1.5GHz frequency. The outer horn receives 250-500MHz signal. Lower coaxial cylindrical waveguide channels signal to our waveport.

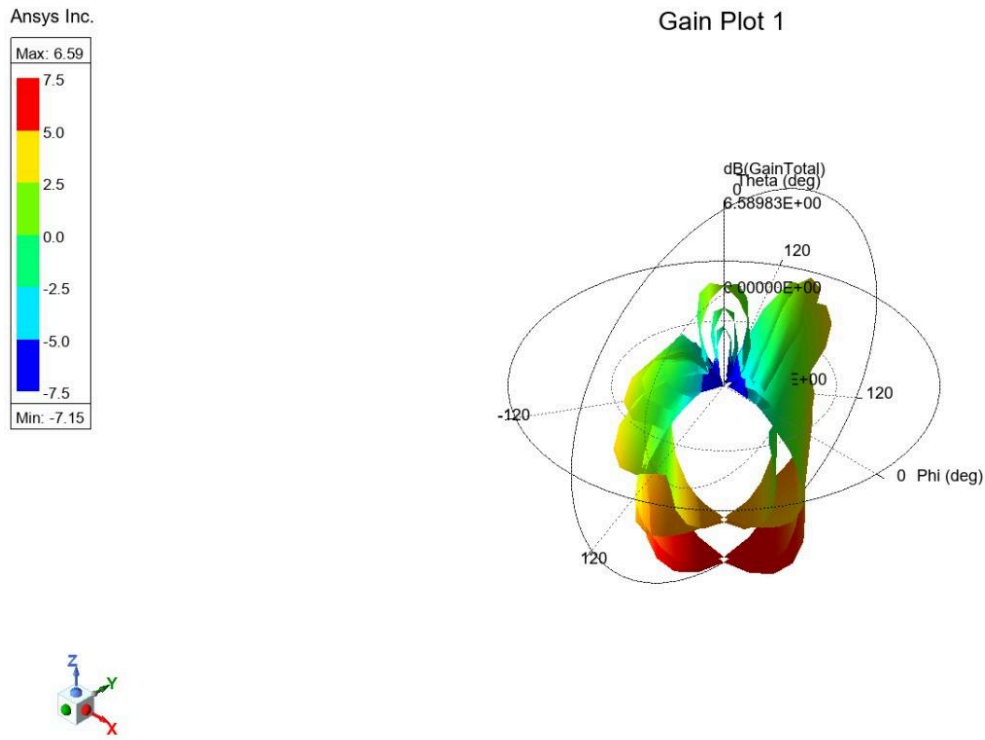


Fig 1.2 This is the radiation pattern using a 3D polar plot for the 250-500MHz band. As seen in the figure, there are multiple sidelobes visible which indicates edge diffraction or phase mismatch.

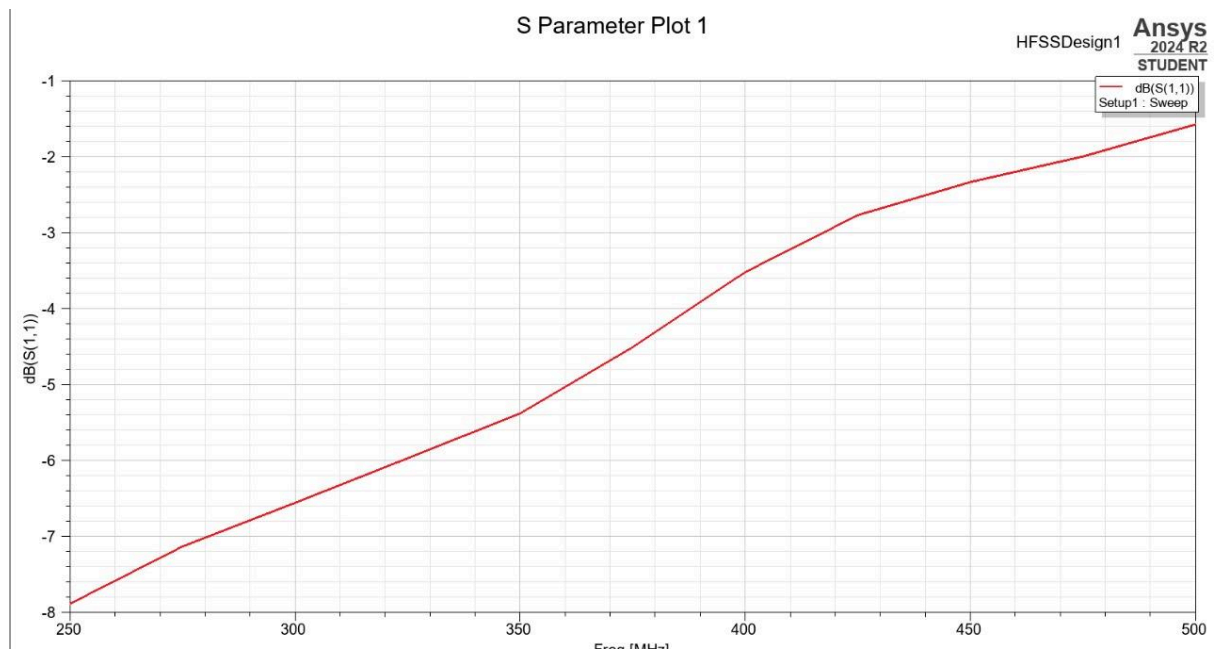


Fig 1.3 This is the return loss parameter which indicates a significant impedance mismatch. To fix this problem, more grooves need to be added to the outer horn.

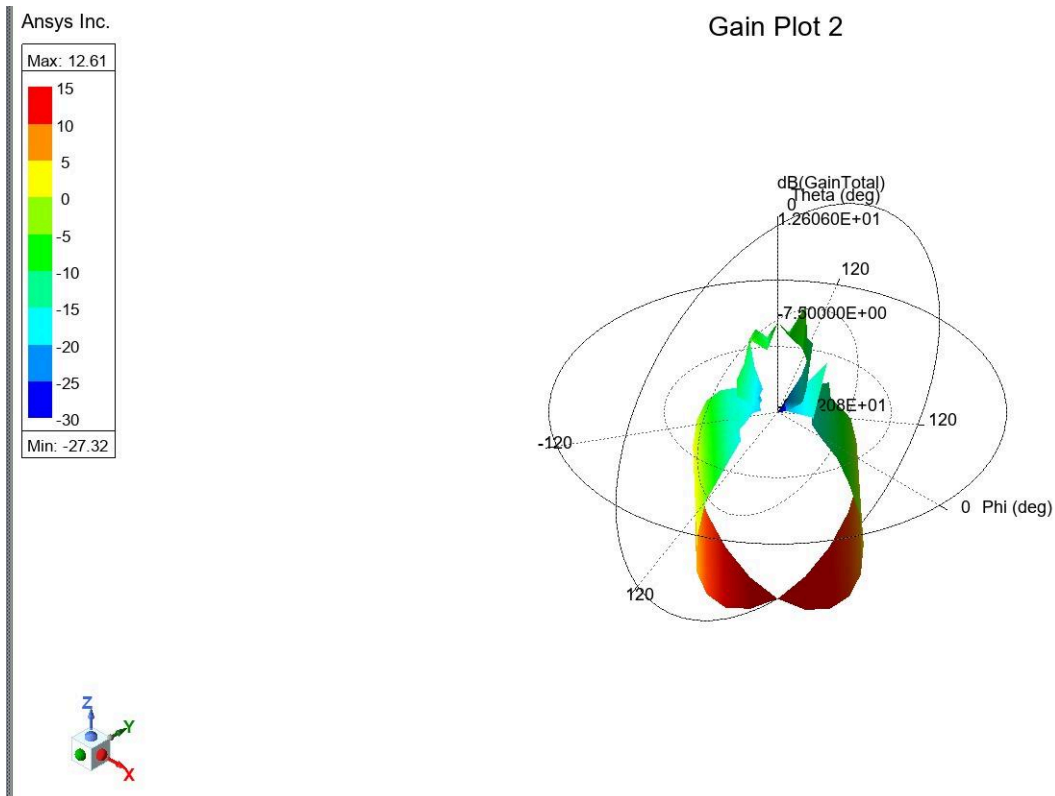


Fig 1.4 This is the radiation pattern for the 1-1.5GHz band. The pattern is perfect with very short sidelobes and symmetrical as well.

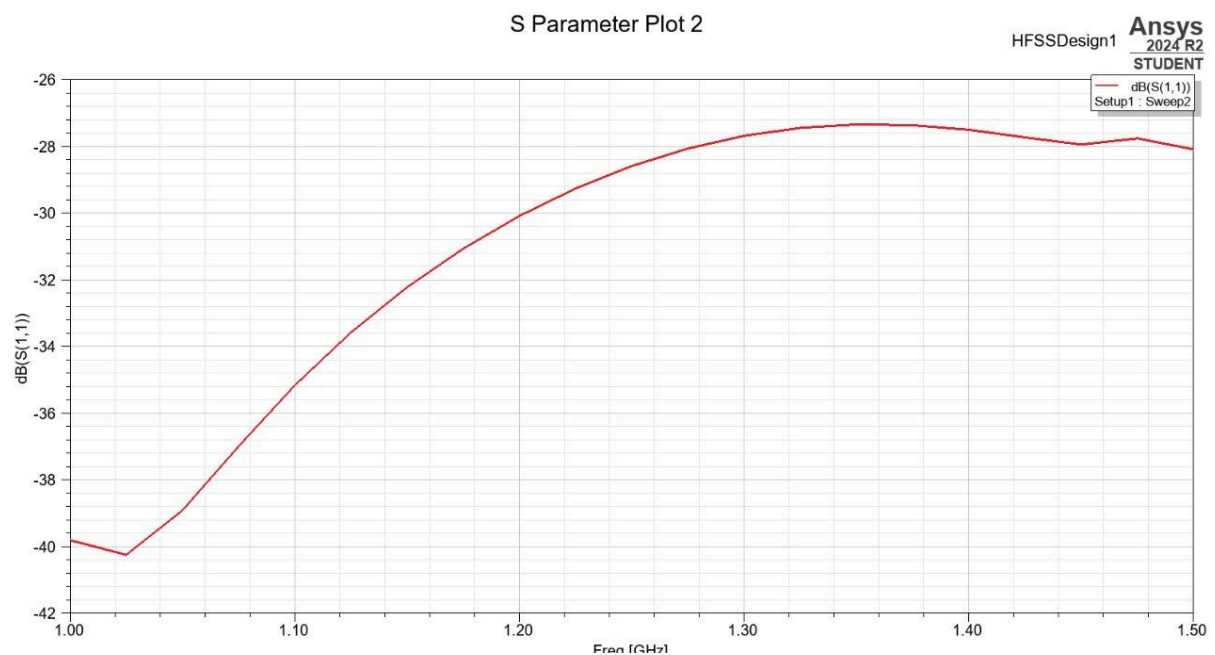


Fig 1.5 The return loss parameters for this band indicate excellent port matching

