

ABSTRACT

Due to high demand for wide bandwidth applications, UWB antennas have received significant attention in many commercial and military application areas. They can provide very wide bandwidth information with a single antenna configuration. However, designing UWB antennas have very strict requirement such as broadband matching, broad beamwidth, and good efficiency throughout the operational frequency band which is generally difficult to obtain.

In this work, the finite different time domain (FDTD) method was selected for the design and optimization of UWB antennas in many different application areas. They include ground penetrating radar (GPR), anechoic chamber feed antenna, near field probe antenna and tapered chamber feed. All these antennas require UWB operation, dual linear polarization, and broad beamwidth. For each application area, they have their own detail operation requirements. With the help of the FDTD code and through understanding, the antennas are deeply studied and analyzed for the final design. This process saves time and cost compared to the repeated prototyping. For the verification of the numerical result, prototype antennas are built, measured and compared to its numerical model result. The measurement and the simulations agree due to the realistic modeling of the geometry.