A DOUBLE-SIDED ROUNDED BOW-TIE ANTENNA FOR UWB COMMUNICATION

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After the United States Federal Communications Commission (FCC) adopted the first Ultra Wide Band (UWB) Report and Order in February 2002, there has been a great interest for commercial UWB technologies. The most important issues in the UWB systems is to design a compact and extremely wide band antenna covering the spectrum from 3.1 GHz to 10.6 GHz. Moreover, good impedance matching characteristics, gain flatness, and phase linearity are required. In this study, we propose a double sided rounded bow-tie antenna for UWB communications.

Finite Element Boundary Integral Method (FE-BI) has been applied to the antenna for determining return loss and radiation characteristics. Finite elements have been extensively used to model open- and closed- domain electromagnetic problems in scalar form in two and three dimensions. For our case, we are employing the tetrahedral elements for the volume and triangular elements for the surface/aperture and metallic structure. Using tetrahedral elements offers higher flexibility when simulating complex structures, and mixed-order tangential vector finite elements (TVFEs) guarantee tangential field continuity across element boundaries and suppress spurious modes. For validation purposes, we also simulated our design using a commercial software (HFSS).

The antenna has reasonable gain flatness above 2.5 dBi and return loss below -10 dB for the whole frequency band. It has omni-directional radiation characteristics and good phase linearity over the same frequency band. We show that the rounded bow-tie patches work better than flat ended conventional bow-ties for the UWB communications. Results regarding antenna parameters such as return loss, radiation pattern and gain will be presented.

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