Characteristics of Downsized Bow-tie Antenna with Folded Elements

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1 Introduction
Bow-tie antenna is one of wideband antennas [1]. It has been reported that the bow-tie antenna has been downsized by adding folded elements [2]. In this paper, antenna characteristics are investigated when elements of the bow-tie antenna are cut.

2 Antenna Structures
We have designed a conventional bow-tie antenna (CBA) to obtain 200 Ω matching from 540 MHz (VSWR≤2). The size is 240 mm x 320 mm. Figure 1 shows the antenna structures. The bow-tie antennas are cut in the shape of point symmetry (PSM) and line symmetry (LSM), respectively.

3 Simulation Results
Figure 2 shows VSWR characteristics of the CBA, PSM and LSM without folded elements. When x2=80 mm, lowest operating frequency (\(f_L\)) (VSWR ≤ 2) is about 500 MHz for both proposed antennas. Those cut bow-tie antennas maintain the same broadband characteristics as CBA, when the size of antenna is half of CBA.

Next, when folded elements are added to the cut bow-tie antennas, changes of the antenna characteristics are studied. Figure 3 shows VSWR characteristics of the CBA, PSM and LSM with two folded elements. By adding the folded elements, \(f_L\) is lowered than those of PSM and LSM without folded elements. However, when x2<120 mm, the VSWR values are more than 2 between 500 MHz and 1000 MHz and lose broadband characteristics. When x2=120 mm, PSM and LSM with folded elements have no degradations around 900 MHz and can obtain more wideband characteristics than the CBA with folded elements. PSM and LSM with folded elements have about 30 % size of CBA. Because the size of CBA with folded elements reduces to 31 %, PSM and LSM with folded elements are slightly more downsized and have more wideband characteristics than CBA with folded elements.

4 Conclusion
In this paper, the characteristics of cut bow-tie antenna with folded elements have been investigated. Cutting bow-tie antenna with folded elements can downsize bow-tie antenna and realize more wideband characteristics than CBA with folded elements.

References