

修士論文題目 A Study of Miniature Dual-Polarization Antenna for Indoor Base Station  
(室内基地局用小形偏波共用アンテナに関する研究)  
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Wireless communication never fails to fascinate human beings. The surprising development of wireless communication always induce antenna engineers to design new types of antenna for the communication system which is more stable and meanwhile possessing larger channel capacity. In the last few years, MIMO (Multiple-Input Multiple-Output) system becomes a noticeable technology due to its outstanding advantages and increasing demand for it. The selection and design of MIMO antennas is extraordinarily important to the realization of MIMO system. Until now, space diversity antenna has been applied as most of the MIMO antennas. However, multipath fading is a problem that cannot be ignored, especially in indoor LOS (Line-of-Sight) environment. To reach the target of reducing multipath fading by using compact antenna, polarization diversity antennas are one of the most correct options.

In this thesis, we propose a miniature dual-polarized antenna. The combined antenna consists of two components, one is vertical polarization antenna and the other is horizontal polarization antenna. The two component antennas are asked to work at the 2 GHz band of IMT-2000, and to radiate the same radiation pattern with orthogonal main polarizations. Omni-directivities in horizontal plane are required. Necessarily, a high isolation is demanded by MIMO systems.

In chapter 1, the demand of indoor miniature base station and existent MIMO antennas are introduced as the background. The proposed dual-polarized antenna is also related. In chapter 2 and 3, we introduce the realization of vertical and horizontal polarization components, respectively. Their structures and characteristics are discussed in detail. The broadband of horizontal polarization component by parasitic elements will be discussed. The way of combination of the two component antennas is talked in chapter 4. To verify the practical performances of proposed antenna, experimental data are provided in this chapter. In chapter 5, we introduce the study of EBG structure which is expected to further widen the bandwidth of antenna. Finally, this thesis is summarized in chapter 6.