Improving the Efficiency of Flexible Antenna for Biomedical Applications using EBG Structure

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Abstract:

Patch antennas are becoming more widely used across a wide range of applications. A common goal of a large majority of these applications is to decrease their size. This creates a problem when using patch antennas because depending on the operation range, their size can be rather large. One way to counteract this issue is to implement an EBG structure behind the patch antenna [1]. This will allow for a slight reduction in size. Another benefit to the EBG structure is that it blocks back lobe radiation. This would be beneficial in cell phone applications because it would prevent radiation from going into the users' brain or hand. The EBG structure does this by suppressing the unwanted surface waves. The EBG structure also increases the directivity of the antenna, which subsequently increases the gain of the antenna. An increase in gain would be beneficial in all applications.

One of the disadvantages of using a patch antenna for biomedical applications is the back lobe radiation of microstrip antenna which will illuminate an unwanted electric field toward the human body. According to Ampere's law, the human tissue consists of conductivity materials, therefore this electric field will create a current which eventually increases the temperature of the human body. We have proposed the EBG structure in the ground plane of the antenna which suppressed the unwanted surface waves that create this back lobe radiation.

In this paper, the results of using flexible microstrip patch antenna with EBG will be presented. The effect of changing the size of the EBG size and the thickness of the substrate will be discussed. The proposed technique can be used for RFID applications and for monitoring the physiological condition of the human body.

Reference:

[1]. F. Yang, et al., IEEE Trans. AP, 52-10, 2936-2946, 2003.