**Lab 11: Design of a** **Dual-Band Patch Antenna For WLAN/WiMAX Band Applications**

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| **Introduction：**  In this experiment, we used HFSS to model and simulate a Dual-Band patch antenna for WLAN/WiMAX band applications. During the simulation, we modeled the antenna structural parameters according to the theoretical content we learned. Finally, after the modeling was completed, we optimized the performance of the antenna by utilizing the functions of HFSS to maintain good performance in the 5.8 GHz band.  **Lab results & Analysis：**  **Question: Design a Dual-Band Patch Antenna For WLAN/WiMAX Band Applications working at 5.8 GHz. The model is shown below:**  20220502141537  **Fig.1: Dual-Band patch antenna. (a) Top view. (b) Bottom View.**  **Model diagram and Simulation Setup:**  Through calculation of relevant parameters, we can establish the following antenna model:  20220502142352  Figure 1 The overall model  20220502142433  Figure 2 The Back of the model  20220502142636  Figure 3 Port configuration  20220502142702  Figure 4 Set the frequency sweep range  **Parameter list:**  20220502142745  20220502142753  Figure 5 All parameters in the model | |
| **Simulation results:**   1. **S-parameter**   **20220502143249**  Figure 6 S-parameter image of this antenna  As can be seen from the above image, the S11 parameter of the antenna reaches a main valley value at 5.68GHz.While around the operating frequency of 5.8GHz, the value of S11 is below -12dB, which reflects the working performance of the antenna we designed basically meets the requirements of the question.   1. **VSWR**   **20220502143600**  Figure 7 The VSWR figure of this antenna  According to the VSWR figure of the antenna model, it can be seen that the valley value of the image appears near 5.6-5.7Hz, which is consistent with the characteristics of the S11 parameter image above, proving that the antenna has low reflection and good performance near 5.8GHz.   1. **Radiation Pattern**   **20220502143733**  Figure 8 The Gain phi/theta radiation pattern of this antenna at 5.8GHz **(phi = 0deg)**  **20220502143847**  Figure 9 The Gain phi/theta radiation pattern of this antenna at 5.8GHz **(phi = 90deg)**     1. **Peak Gain**   **20220502143959**  Figure 10 The Peak Gain figure of this antenna   1. **Radiation Efficiency**   **20220502144044**  Figure 11 The Radiation Efficiency figure of this antenna   1. **3D polar plot**   **20220502144206**  Figure 12 The 3D polar plot of Gain total of this antenna  **Experience**  In this experiment, we deepened the modeling process of HFSS and designed a Dual-Band patch antenna for WLAN/WiMAX band applications by combining HFSS with theoretical calculation. Through the simulation of our model, we can get the images of various parameters of the antenna, and further deepen the understanding of the antenna properties with the theory. Finally, through our simulation we can achieve good performance at the specified working frequency point of our antenna. | |
| **Score** |  |