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# 基于 5G 的小型化天线的设计

DESIGN OF MINIATURIZED ANTENNA BASED ON 5G





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## 摘 要

随着移动通信和天线技术发展，近年来信息进入高速发展阶段，天线作为无线通信系统信号收发单元，对通信质量会产生直接的影响。天线的模型比较多，微带天线有多方面的优势，如灵活性高，重量轻，尺寸小等，因而目前在很多领域被广泛的应用。随着无线通信系统的要求不断提高，通信系统的小型化趋势日益明显，在以后的移动通信领域，小型化天线是人们研究的重点方向。

结合 5G 移动通信的特点和当下微带天线发展的趋势，本文主要设计一款基于 5G 的小型化微带天线，从小型化和超宽带方面来进行研究，采用 HFSS 软件研究仿真一款微带小型化天线。该天线覆盖频带为 2270MHz 频段范围为 1630MHz-3900MHz 的小型化天线，本文选取的中心频率是 3.3GHz，采用侧馈的馈电方式，设计一款矩形微带天线，对它进行优化，重点从回波损耗特性和增益两个性能参数来分析天线的性能，最后采用表面开槽的方式来进行小型化设计，而确定出相应的 Smith 圆图，截面以及三维增益方向图等结果图，通过结果图来分析天线性能的好坏，进行一定的优化改进之后而得到性能良好的小型化天线。

本文设计的这款小型化微带天线，和现在市面上的相比，结构比较新颖，性能比较优越，与当前研究的大多数天线相比较有较小体积，较高带宽的优点，达到预期设计要求，符合当下移动天线发展的需求。

**关键词：**5G 天线；小型化；微带





## Design Of Miniaturized Antenna Based On 5g

### Abstract

With the development of mobile communication and antenna technology, information has entered a high-speed development stage in recent years. As the signal receiving and transmitting unit of wireless communication system, antenna will have a direct impact on communication quality. The microstrip antenna has many advantages, such as high flexibility, light weight, small size and so on, so it is widely used in many fields. With the increasing requirements of wireless communication system, the trend of miniaturization of communication system is increasingly obvious. In the future mobile communication field, miniaturization antenna is the focus of research.

Combined with the characteristics of 5g mobile communication and the current development trend of microstrip antenna, this paper mainly designs a Miniaturized Microstrip Antenna Based on 5g, which is researched from miniaturization and ultra wideband, and uses HFSS software to study and simulate a Miniaturized Microstrip antenna. The antenna covers a miniaturized antenna with a frequency band of 2270mhz and a frequency range of 1630mhz-3900mhz. The central frequency selected in this paper is 3.3GHz. A rectangular microstrip antenna is designed and optimized by side feeding. The performance of the antenna is mainly analyzed from two performance parameters of return loss and gain. Finally, the miniaturized antenna is designed by surface slotting. The results of Smith circle, cross section and three-dimensional gain pattern are determined. The performance of the antenna is analyzed by the results. After some optimization and improvement, a miniaturized antenna with good performance is obtained.

The Miniaturized Microstrip antenna designed in this paper has novel structure and superior performance compared with the current ones on the market. Compared with most of the antennas studied at present, it has the advantages of smaller size and higher bandwidth. It meets the expected design requirements and meets the needs of the current mobile antenna development.

**Keywords:**5g Antenna; Miniaturization; Microstrip





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