COMPUTER-AIDED WIRELESS MICROSTRIP ANTENNA DESIGN

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Bachelor of Electrical Engineering (Hons)

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ABSTRACT

The application of microstrip antennas has become popular because of various advantages such as lightweight, simplicity of fabrication and ease of mass production. Most of the design procedures currently employed in practice for designing microstrip patch antennas make use of the equivalent network models coupled with experimental iterations of the initial design. However, due to increasing interest in the use of microstrip antenna technology, computer software has been developed for accurate design of microstrip patches. One of these is 'Computer-Aided Design for Microstrip Antenna' (CADMS). Another software which also available is HPEESof LIBRA. In this project CADMS and LIBRA packages are used to design and analyse the rectangular microstrip antenna. The main objectives of this project are:

1. Study, analyse and design a rectangular patch antenna using CADMS and LIBRA techniques.
2. Study and implement the techniques of improving the bandwidth of the antenna.

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CHAPTER 1

1.0 MIROSTRIP ANTENNA

1.1 General

Today, microstrip antenna is one of the most innovative topics in antenna technology. This trend is likely to continue as the characteristic of a microstrip antenna make them very appealing from a system perspective [1]. It is not the electrical characteristics of the basic microstrip antenna that has lead to this appeal, but rather its mechanical and fabrication features such as conformability and its easy integration with Microwave Integrated Circuits (MIC's). There are many different varieties of microstrip antennas, but their common feature is that they basically consists of four parts:

1. a very thin flat metallic region often called the *patch*
2. a *dielectric substrate*
3. a *ground plane*, which is usually much larger than the patch
4. a *feed*, which supplies the element rf power

A typical microstrip element is illustrated in Fig. 1. Microstrip elements are often made by etching the patch (and sometimes the feeding circuitry) from a single printed-circuit board clad with the conductor on both of its sides.

The longest dimension of the patch is typically about a third to a half of free space wavelength (λ_o), while the dielectric thickness is usually in the range of $0.003\lambda_o$ to $0.05\lambda_o$. A relative dielectric constant around 2.5 is typical. Sometimes a