

New Thoughts And Innovations For Wider Applications Of Microstrip And Dielectric Resonator Antennas

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Abstract This article addresses major technical contributions started and done initially by me, and later on in collaboration with my students and associates. All the works are in the field of microwave and wireless antennas, which include both microstrip and dielectric resonators. Only those works, which show considerable impact on antenna community and industry, have been considered in here for discussion.

Keywords: Microstrip antenna, dielectric resonator antenna.

1. INTRODUCTION

Primary aim of this article is to focus on my research works, which I started in late 1990s and subsequently pursued with my students and associates and especially those which showed considerable impact on antenna community in a short period of time. All the works included in this article are available in open literature, published during the period of 2001-2012. They include both microstrip and dielectric resonator antennas for microwave and wireless applications.

For microwave frequencies, only aperture type antennas were known until 'microstrip antenna' was realized in early 1970s [Howell (1972)]. 'Microstrip' is very similar to 'printed circuit board' or PCB, which uses low-loss thin dielectric wafer, sandwiched between two thin layers of copper. Microstrip antenna grew over last four decades and has become inevitable part of modern civilization. If we now decide to withdraw

'microstrip antenna' from every sphere of its application, within a moment it will create the crisis of survival without having any telephone, cell phone, internet; GPS service; radar and navigational aids; civil aviation; object identification; defence and security, and also advanced medical support.

In 1990's, the concept of integrated antenna grew rapidly and those used microstrip as basic antenna

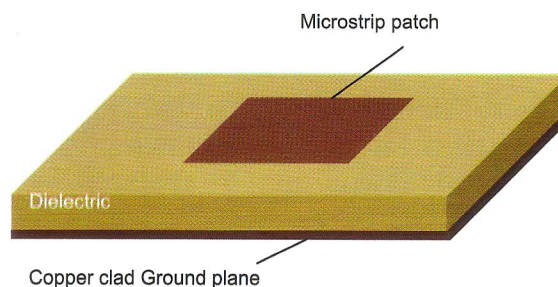


Figure 1: Conventional geometry of microstrip patch

element. Late 1990s was the time when I entered into the antenna field and picked up microstrip for doing research, especially with a view to explore multi-layered microstrip structures for advanced design. This ultimately led to establishing advanced design concepts, which are now commonly used by others, and some of which have been adopted in famous text book by J D Kraus and others [Kraus et al. (2010)]. Those works are discussed in Section-2.

In a microstrip circuit or antenna, the electromagnetic fields are confined within the

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