ANTENNAS AND PROPAGATION

Modeling, Simulation & Measurements

Edited by

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Chapter 9

Multi-Band Reconfigurable Antenna Using RF Mems Switch

AHM Zahirul Alam[1] and Md. Rafiqul Islam[1]

9.1 Introduction

Reconfigurable multi-band antennas are attractive for many military and commercial applications where it is required to have a single common aperture antenna that can be dynamically reconfigured to transmit (or receive) on multiple frequency bands. Such common-aperture antennas lead to considerable savings in size, weight and cost. They find applications in space-based radar, communication satellites, electronic intelligence, and aircraft navigations besides many other communications and sensing applications. A number of different reconfigurable antennas, such as planar and 3-D have been developed. Some of them are developed for radar applications [1]-[2] and other planar antennas are designed for wireless devices [3]-[4]. Reconfigurable slot antennas are designed for UHF [5]. Reconfigurable patch antennas are also designed to operate in both L and X bands [6].

Radio frequency microelectrical mechanical systems (RF MEMS) is an emerging technology that promises the potential of revolutionizing RF and microwave systems implementation for the next generation of telecommunication applications. Its low-power, excellent RF performance, large tuning range, and integration capability are the key characteristics, enabling system implementation with potential improvements in size, cost, and increased functionality.

In this chapter, a multi-band reconfigurable antenna using RF MEMS switches design method is describe to operate at different frequency bands.

9.2 Antenna Design

The schematic diagram of the reconfigurable antenna is shown in Figure 9.1. It consists of three patches placed on a 18×10 mm^2 Rogers substrate of thickness 0.32mm. The centre patch of dimension 4×3 mm^2 and two side patches defined as wing patches, separated by gap of 0.5mm. The co-axial feeding point is placed at the centre patch. The length of the wing patch is chosen as L_w=5mm and the width is defined as "W_w". Cantilever type MEMS switches are considered for the design, which consist of cantilever bridges and MEMS contacts. The length of bridges is 10 mm long, 1mm wide, 20μm thick and placed above the patch gaps. The MEMS are placed on the centre of bridge with 1mm long and 100μm wide contacts. The distance between the patch and the MEMS is 5μm, which the MEMS are considered "OFF".

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