Frequency Reconfigurable Microstrip Circular Patch Array Antenna Integrated with RF-MEMS Switches

Naveen Kumar Saxena and Dr. P.K.S. Pourush
Microwave Lab Department of Physics Agra College Agra
PIN 282002 (U.P) India. Email: Nav3091@rediffmail.com

Abstract: A microstrip reconfigurable array antenna with integrated RF-MEMS switches is proposed which can operate at dual frequencies. The switches are incorporated to circular patch to control or change the frequency. The array of these circular patches gives more directivity and scanning power, which makes it very useful in Mobile Communication System.

The capability to select the frequency is essential for diverse missions. A simple idea to adjust the resonant frequency of an antenna is to reconfigure the geometrical structure. This has been made possible with the use of the RF-Micro Electromechanical System (MEMS) switches. The MEMS devices can outperform their semiconductor counterparts such as transistors and diodes in lower insertion loss, lower power during operation and higher Q which inherently fits the antenna elements.

To reconfigure the structure additional patch ring is placed around the main patch. These switches are cantilever based type. The actuated cantilever opens and closes the gap between two ports or patches. A clearance of 2mm above the surface of ports or patches, when open provides 25dB isolation at 50 GHz. The isolation increases as frequency decreases.

In this communication, an array of 16 elements (4×4) is proposed. Each element of this array is connected with parasitic patch with the help of RF-MEMS switches. These switches are based on actuation provided by thin film Lead Zirconate Titanate (PZT) deposited on thin cantilever.