WIDEBAND CYLINDRICAL DIELECTRIC RESONATOR ANTENNA EXCITED USING AN L-STRIP FEED

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ABSTRACT: *A broadband cylindrical dielectric resonator antenna (DRA) energized with an L-strip feed is presented. The novel exciting technique achieves a 2:1 VSWR bandwidth of 18%. The variation of bandwidth for different feed parameters is also studied.* © 2004 Wiley Periodicals, Inc. Microwave Opt Technol Lett 42: 293–294, 2004; Published online in Wiley InterScience (www.interscience.wiley.com). DOI 10.1002/mop.20281

Key words: *cylindrical dielectric resonator antenna; bandwidth enhancement; L-strip feed; electromagnetic coupling*

1. INTRODUCTION

The revolutionary progress in the field of microwave communication demands miniaturization and reduction of weight of microwave circuits. A microstrip antenna is an ideal choice for communication purposes, but it offers a narrow bandwidth. Recently, a planar L-strip feed has been applied successfully to a rectangular microstrip antenna for improving the bandwidth [1]. When dielectric resonators (DRs) are loaded on a patch antenna, the bandwidth is improved up to 10% [2]. A DR placed over a ground plane can serve as an effective radiator, since the electromagnetic fields extend beyond the geometrical boundary of the cavity [3]. The dielectric resonator antenna (DRA) is of small size, light weight, and devoid of conductor losses, and it can easily be excited. DRAs of different ceramic materials with permittivity ε_{dr} ranging from 10 to 100 have been investigated by many researchers. DRs with $30 < \varepsilon_{dr} < 60$ are the most suitable for antenna applications, so that a compromise can be made between size, operating frequency, and other antenna properties such as radiation performance [2].

In this paper, a cylindrical DRA energized using an L-strip feed is presented. The antenna offers an impedance bandwidth of 18.47% with radiation coverage similar to that of microstrip patch antennas.

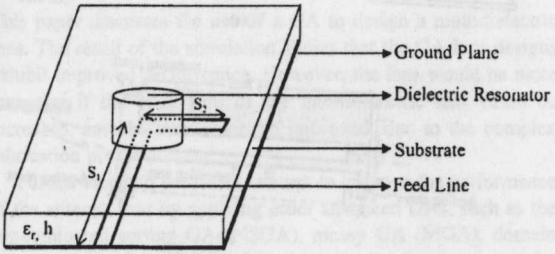
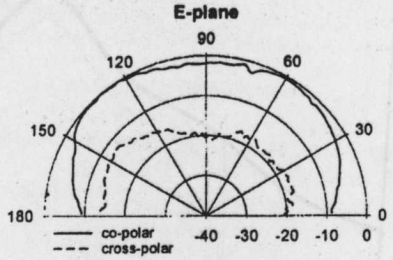


Figure 1 Geometry of the proposed planar L-strip-fed cylindrical dielectric resonator antenna



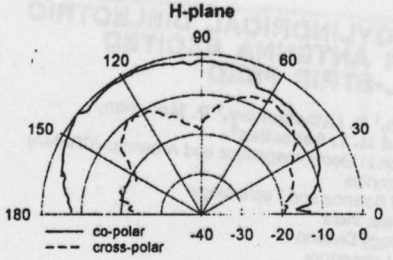


Figure 4 Radiation pattern of the proposed antenna at the centre frequency (h = 1.6 mm, ε_r = 4.28, S_1 = 50 mm, S_2 = 30 mm)

and $S_2 = 3$ cm. The variation of S_{11} as a function of frequency is shown in Figure 3.

The antenna operates in the 2.545–3.04-GHz band, at a center frequency of 2.68 GHz. The HPBW of the antenna in the E and H planes are 120° and 90° at the resonant frequency, respectively. The radiation pattern of the antenna at the resonating frequency for the above feed parameters is shown in Figure 4.

4. CONCLUSION

A cylindrical DRA of relatively low-density material energized with an L-strip feed has been reported. The proposed antenna configuration offers a large bandwidth of 18% and ensures light weight.

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