

### **RHCP single patch antennas with single feed**

I. J. Dayawansa and H. M. S. B. Senavirathna

*Department of Electronic and Telecommunication Engineering, University of Moratuwa, Moratuwa*

Circularly polarized (CP) antennas have the advantage that they can be used without the need for strict antenna alignment as linearly polarized antennas. This paper presents results of several right hand circularly polarized (RHCP) patch antennas designed for X-band and L-band in the microwave region. Different mode-detuning methods were employed to produce circular polarization that uses a single feed. A square patch and a circular patch were designed and implemented for 9.4 GHz in the X-band. The theoretical and experimental radiation patterns showed broad beams. A square patch and two circular patches were also designed for resonance at 1.6 GHz in the L-band and it also produces good agreement of the far field radiation pattern between theory and experimental. In this antenna design mode detuning was achieved with embedded and ear perturbations and the techniques were successful in obtaining circular polarization.

The maximum gain of the antenna being at a frequency different from the design frequency was expected as the mode detuning method of feed introduces perturbation segments to the patch which is initially designed for resonance. It excites two orthogonal modes at a slightly different frequency: one mode leading by  $45^\circ$  and the other mode lagging by  $45^\circ$ ; thus the two orthogonal modes are out of phase by  $90^\circ$  to produce CP. Results indicate that the different detuning methods show equally good performance for single feed antennas. The antenna constructed for the L-band is promising and will be a suitable vehicular antenna for MSAT or GPS applications.