Dual Frequency and Dual Circular Polarization Microstrip Nonresonant Array Pin-Fed From a Radial Line

Reuven Shavit, *Senior Member, IEEE*, Lev Pazin, Yaniv Israeli, Michael Sigalov, and Yehuda Leviatan, *Fellow, IEEE*

***Abstract*—A new type of a dual frequency and dual circular polarization multilayer microstrip nonresonant antenna array for satellite communication is presented. The microstrip radiating elements in the array are arranged in concentric circles and fed through pins embedded in a radial line. The radial line is excited through a probe at its center. The microstrip array exhibits a dual frequency band of operation, low side-lobes in the radiation pattern, and high radiation efficiency (more than 65%) for both polarizations. The microstrip element has been designed using commercial software based on the method of finite integral time domain algorithm, and the feed network has been designed by a theoretical analysis. A prototype of the array has been built and tested. The agreement between the measured and numerical results is satisfactory.**

et al. [4] replaced the helices with circular polarized microstrip elements to obtain a high efficiency (90%) antenna in Ku band. These elements were used also by Yamamoto *et al.* [5] to design a circular array antenna with shaped beam. In the circular polarization antennas described in [2]–[5], the arrays are nonresonant and uniformly excited. Hence, the outer circle of radiating elements in these arrays is strongly coupled to the waveguide and serves also as an effective termination (load of the waveguide). Other types of the radial line planar microstrip array antennas are described in [6], [7].

In this paper, a new type *Ku* band, dual frequency and dual circular polarization multilayer microstrip array antenna with low