Frequency scanning microstrip antennas

The principles of using radiating microstrip resonators as elements in a frequency scanning antenna array are described. The resonators are cascade-coupled. This gives a scan of the main lobe due to the phase-shift in the resonator in addition to that created by the transmission line phase-shift. Experimental results in X-band, in good agreement with the theory, show that it is possible to scan the main lobe an angle of ±30° by a variation of the frequency ±300 MHz, and where the 3 dB beamwidth is less than 10°. The directivity was 14.7 dB, while the gain was 8.1 dB. The efficiency might be improved by a trade-off between the efficiency and the scanning angle, or by using a better amplitude distribution.