Reconfigurable Microstrip Yagi-Uda Antenna with Steerable Circularly Polarized Beam

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Abstract: The recent demand of compact wireless devices propels the development of pattern reconfigurable antennas. They can steer their beam direction that helps in avoiding noisy environment, and strengthening the signal detection from an intended target. Classically, beam steering is realized with phased arrays, but it might be too large or complex to meet the demand of compactness or cost reduction. This paper proposes a novel reconfigurable microstrip antenna with circularly polarized beam scanning feature. It is based on a microstrip Yagi-Uda antenna of two square patches. One patch is driven with two orthogonal feeds and the other is parasitic. The parasitic patch is loaded with four lumped varactors and a DC biasing network, to effectively change its electrical size. Because the main beam direction is determined by the electrical size of the parasitic patch, electronic beam scanning is allowed by changing the capacitance value through the applied DC voltage. Operating at 2.45 GHz, the antenna shows a beam scanning range from -36° to 32° with 2.3 dB gain variation across the entire scanning range and gain peak value of 8.1 dBd.

Keywords: Reconfigurable antennas, beam scanning antennas, Yagi-Uda microstrip antenna, circular polarization.

References:


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