

Reduction of wide-band crosstalk for guiding microwave in corrugated metal strip lines with subwavelength periodic hairpin slits

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Abstract

A new type of microstrip line on which the spoof surface plasmon polaritons (SPPs) can propagate in microwave band is developed and a scheme for reducing the wide-band crosstalk between transmission lines is proposed. The microstrip line structure is designed by introducing periodic subwavelength hairpin structure on the edge of conventional microstrip lines. Numerical methods are used to analyse the dispersion relation and guiding bandwidth in microwave regime. Besides, the authors experimentally verify that such periodically structured microstrip lines support spoof SPPs in the frequency range between 200 and 8 GHz. Compared with the quasi-transmission electron microscopy mode in conventional microstrip line, the spoof SPPs mode can be highly localised on the surface of the structured microstrip lines, and so the crosstalk between different structured microstrip lines is very weak, for example, the crosstalk between one conventional microstrip line and one structured microstrip line ranges from 219.89 to 262.39 dB (which is much lower than the crosstalk between two conventional microstrip lines) when the distance between the two microstrip lines is the same as the width of the microstrip line. Therefore this new kind of periodically structured microstrip line would be of great use in high-density microwave circuits and high-speed systems to guarantee signal integrity.

Keyword : spoof surface plasmon polariton, crosstalk, coupler