

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

吳俊傑, Di Chi Tsai, 楊宗哲, 林鴻兒, Her-Lih Chiueh, Linfang Shen, 謝暉家, Jian

Qi Shen, 歐陽為廉, Zhen Gao

Electrical Engineering

Engineering

jjwu@chu.edu.tw

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 analyze the dispersion relation and guiding bandwidth in microwave regime. Besides, we experimentally verify that such periodically structured microstrip lines support spoof surface plasmon polaritons(SPPs) in the frequency range between 200MHz and 8GHz. Compared with the quasi-TEM mode in conventional microstrip line, the spoof SPPs mode can be highly localized on the surface of the structured microstrip lines, and so the crosstalk between different structured microstrip lines is very weak, e.g., the crosstalk between one conventional microstrip line and one structured microstrip line ranges from dB to 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 polaritons, microstrip line, crosstalk, coupler