

Spectral Domain Analysis of Resonant Characteristics of High T_c Superconducting Rectangular Microstrip Patch Printed on Isotropic or Uniaxial Anisotropic Substrates

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Abstract In this paper, radiation characteristics of the perfectly superconducting, or an imperfectly conducting rectangular microstrip, which is printed on isotropic or uniaxial anisotropic substrate are investigated using a Fourier transforms domain in conjunction with the stationary phase method. The effects of uniaxial anisotropy on the resonant frequency, half-power bandwidth, and radiation patterns are investigated as the function of anisotropy ratio values of substrate materials. It is found that the resonant frequency and the half-power bandwidth are affected significantly by the superconductivity property of the patch. Further results show that a thin superconductor patch has a significant effect on the radiation pattern. Results are compared with previously published data and are found to be in good agreement.

Keywords Superconducting microstrip patch · Anisotropic substrate · Radiation patterns

1 Introduction

Microstrip antennas have a number of useful properties, which are employed as radiating or receiving elements in a wide range of microwave systems, such as radar, navigation, communication [1–4]. The successful operation of, for example, the microstrip resonators seems to suggest that basically they are poor radiators [5]. Despite this weakness microstrip antennas have received much attention in the open literatures because of their many unique and attractive properties [6]: low in profile, light in weight, compact and conformable to both

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