

Analysis of High T_c Superconducting Rectangular Microstrip Patches over Ground Planes with Rectangular Apertures in Substrates Containing Anisotropic Materials

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Abstract: A rigorous full-wave analysis of high superconducting rectangular microstrip patch over ground plane with rectangular aperture in the case where the patch is printed on a uniaxially anisotropic substrate material is presented. The dyadic Green's functions of the considered structure are efficiently determined in the vector Fourier transform domain. The effect of the superconductivity of the patch is taken into account using the concept of the complex resistive boundary condition. The accuracy of the analysis is tested by comparing the computed results with measurements and previously published data for several anisotropic substrate materials. Numerical results showing variation of the resonant frequency and the quality factor of the superconducting antenna with regard to operating temperature are given. Finally, the effects of uniaxial anisotropy in the substrate on the resonant frequencies of different TM modes of the superconducting microstrip antenna with rectangular aperture in the ground plane are presented.

Keywords : Anisotropic material, Anisotropic substrates, Dyadic green's functions, Operating temperature, Rectangular aperture, Rectangular microstrip patch, Superconducting microstrip antennas, Uniaxially anisotropic substrate