Abstracts

Field Theory Treatment of H-Plane Waveguide Junction with Triangular Ferrite Post

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This paper presents an exact field theory treatment for the H-plane waveguide junction with three-sided ferrite prism. The treatment is general, being independent of the geometrical symmetry of the junction, the number of ports, and the location of the ferrite post inside the junction. The solution of the wave equations in the ferrite post and in the surrounding region is written in the form of an infinite summation of cylindrical modes. The fields at the ferrite-air interface are matched using the point-matching technique. This results in two amplitudes for the cylindrical modes describing the fields in the air region in the form of a matrix. The fields at the arbitrary boundary between the air region and the waveguides are also matched using the point-matching technique. This results in a finite system of nonhomogeneous equations in the field amplitudes. The three-port waveguide junction circulator with central triangular ferrite post is analyzed using this technique. Two specific arrangements are considered. In the first arrangement, the points of the triangles are in the centers of the waveguides, and in the second, the sides of the triangles are in the centers of the waveguides. The method used in this paper can also be applied to study the effect of the ferrite-post geometry on the circulator performance in order to seek the best possible circulator structure. Excellent agreement has been found between published experimental measurements and the numerical results obtained by this technique in the case of a waveguide junction circulator with cylindrical ferrite post.

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