# Abstracts

## An efficient method to analyze the H-plane waveguide junction circulator with a ferrite sphere

This paper presents an approximate, but efficient field treatment of the new easy-to-fabricate ferrite-sphere-based H-plane waveguide circulator for potentially low-cost millimeter-wave communication systems. A new three-dimensional modeling strategy using a self-inconsistent mixed-coordinates-based mode-matching technique is developed, i.e., the solutions of the Helmholtz wave equations in the ferrite sphere and in the surrounding areas are deduced in the form of infinite summation of spherical, cylindrical, and general Cartesian modes, respectively. The point-matching method is then used on the interface between the ferrite sphere and air within the cylindrical junction, as well as the interface between the junction and waveguides to numerically obtain the coefficients of different orders of basis functions of the field. Therefore, the field distributions, as well as the characteristics of the circulator, are numerically calculated and good agreement is observed between the numerical results and measured data.

❑