Abstracts

Modal analysis of discontinuities between elliptical waveguides

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Elliptical waveguides are currently finding applications in several components as corrugated horns, cavities for dual-mode filters and feeds for reflector antennas since they provide improved flexibility, better manufacturability, and higher Q with respect to either circular or rectangular waveguides. Efficient computer-aided design of components involving elliptical waveguides requires rapid evaluation of the scattering parameters at the discontinuities. To this end, we derive analytical formulas for full-wave study of a general junction between two elliptical waveguides and the relative specialization to the case of a junction between a circular and concentrical elliptical waveguide of larger cross section. With respect to current approaches, which are generally based on the numerical evaluation of the coupling integrals, the proposed analytical formulas allow to achieve a significant reduction of computer time. Results have been tested against published data and have also been compared with data obtained by numerical evaluation of the coupling integrals; in all cases, an almost perfect agreement has been observed.

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