Numerical analysis of complicated waveguide circuits on the basis of generalized scattering matrices and domain product technique

H- and E-plane waveguide structures having arbitrarily polygonal boundaries and piecewise homogeneous fillings are considered in this paper. A modified version of the generalized scattering matrix (S-matrix) method is applied to their analysis. More specifically, the segmentation of the whole unit is carried out. A homogeneously filled multiangular region, supplied with flanged apertures, is taken as a key building block. The scattering matrix of the block consists of amplitudes of elliptic waves propagating from the apertures in the corresponding half-spaces. Evaluation of the S-matrix is based on the domain product technique (DPT). Numerical examples demonstrating the efficiency, flexibility, and reliability of the approach are also presented.