Abstracts

Analysis of Cylindrical Transmission Lines with the Method of Lines

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Cylindrical transmission lines are important for a variety of applications. To calculate their propagation characteristics, the method of lines in cylindrical coordinates has been adopted. By discretizing the angular space direction with radial lines, the two-dimensional (2-D) Helmholtz equation reduces to a set of ordinary one-dimensional (1-D) differential equations, which can be solved analytically in radial direction after an orthogonal transformation. To improve the accuracy of the cylindrical method of lines from second-order to fourth-order, neighboring lines are used to eliminate second-order discretization errors not only in the Helmholtz equation but also in the continuity equation and in the edge condition. The method is suitable for the analysis of asymmetric cylindrical homogeneous and inhomogeneous guided wave structures.

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