A field theoretical foundation of the TLM method is presented in this paper. In the derivation of the condensed symmetric TLM node, the Method of Moments is applied to Maxwell’s equations to obtain discretized field equations. It is shown that the traditional mapping between wave amplitudes and electric and magnetic field components incorporates serious problems. Therefore, a new mapping between the wave amplitudes and the electric and magnetic field components is introduced. Applying the new mapping to the discretized field equations, the fundamental equations of the three-dimensional TLM method with condensed symmetric node are derived from Maxwell’s equations.

Stichworte: condensed symmetric node, discretized field equations, electromagnetic field theory, field theoretical derivation, fundamental equations, Maxwell equations, Maxwell’s equations, method of moments, numerical analysis, TLM, transmission line theory
http://doi.org/10.1109/22.310559

Occurences:
- Einrichtungen > Fakultäten > Fakultät für Elektrotechnik und Informationstechnik > Lehrstühle und Professuren > Hochfrequenztechnik (Prof. Eibert) > 1994

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