

“Transient analysis of metamaterial transmission lines”, pp.305-311

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Abstract – This paper presents the transient analysis of metamaterial transmission lines. A ladder network model is used to simulate propagating and evanescent modes generated by negative permeability and permittivity. For such a kind of periodic structure quasi-closed form of poles and residues is presented leading to an efficient time domain macromodel. Furthermore, the same methodology can be also efficiently used when the metamaterial is characterized in terms of equivalent dispersive and lossy permeability and permittivity over a frequency range. In both the cases a model order reduction (MOR) technique is proposed allowing to reduce the computational effort in carrying out time domain simulations. The numerical results confirm the robustness and the accuracy of the proposed method in capturing the physics of metamaterials and in reducing the computational complexity due to the dispersive behavior of such artificial materials.