[COMPLEX RELUCTANCE OF INHOMOGENEOUS EULER-CAUCHY TUBULAR FERRITES TAKING INTO ACCOUNT FREQUENCY-DEPENDENT COMPLEX PERMEABILITY J. A. Brand˜ao Faria]

|  |  |  |
| --- | --- | --- |
|  | Electric | Magnetic |
| Skin Effect inclusion |  |  |
| Losses |  |  |
| Axial fields. Euler- Cauchy Equation | P is homogeneity parameter. | P is homogeneity parameter. |
| Stored Energy |  |  |
| Circuit laws |  |  |
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[A Matrix Approach for the Evaluation of the Internal Impedance of Multilayered Cylindrical Structures]

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| --- | --- | --- |
|  | Electric | Magnetic |
|  | k is complex wave number |  |
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[FORMULATION OF MULTIWIRE MAGNETIC TRANSMISSION-LINE THEORY]

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|  | Electric | Magnetic |
|  |  | is the flux rate. U is magnetic voltage. |
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[Matrix theory of wave propagation in hybrid electric/magnetic multiwire transmission line systems]

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| --- | --- | --- |
|  | Electric | Magnetic |
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[MEEP]

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| --- | --- | --- |
|  | Electric | Magnetic |
|  | **P** is polarization density | **M** is polarization density. |
| Lorentzian susceptibility | Sum of harmonic resonances plus a term form frequency independent electric conductivity. Sigma-n couples the polarization to the driving field, omega-n is the angular frequency of precession, gamma-n is a damping factor.  Term containing bn (bias vector) is responsible for gyrotropy. Precession occurs around bn unit vector. It represents the angular frequency of precession induced by the external field.  For ferromagnetic materials, gyromagnetic saturated dipole Landau-Lifshitz-Gilbert equation is used |  |
| Susceptibility tensor for gyrotropic Lorentzian model | For ferromagnetic materials, gyromagnetic saturated dipole Landau-Lifshitz-Gilbert model, |  |
| Instantaneous isotropic Pockels and Kerr Non-linearity | can be changed by the E field. Chi-2 sum is the Pockels effect. Chi-3 sum is the Kerr effect |  |
| SI units Weber Convention  Ampere’s Law |  |  |
| Faraday’s Law of Induction |  |  |
| Gauss’s Laws |  |  |
| Lorentz Force Equation |  |  |