Electrostatic Method of Moments

E8-202 Class 4

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Module 2: Method of Moments

- 2D vs 2.5D vs. 3D Formulations
- Electrostatic Formulation: Capacitance matrix extraction
- Magnetostatic Formulation: Inductance matrix extraction
- Electric Field Integral Equation (EFIE): S-parameter extraction
- Partial Element Equivalent Circuit (PEEC) Method
- Magnetic Field Integral Equation (MFIE) and Combined Field Integral Equation (CFIE)
- PMCHWT Formulation: Dielectric modeling
- Parallelization techniques
References

- Walton C. Gibson: The Method of Moments in Electromagnetics, 1st Ed., Chapman and Hall, Chapter 3
Surface Equivalence Principle
Surface Equivalence Principle

Null Fields
Reciprocity Theorem

Scenario 1

Scenario 2

\[ \langle E_1, J_2 \rangle = \langle E_2, J_1 \rangle \]
2D vs 2.5D vs 3D
Electrostatic MoM: PEC only

- EM Equation
- Greens Function
- Boundary Condition
- CAD
- Mesh
- MoM matrix
- LHS vector
- RHS vector
- Solve
- Post Process
Integration

• Analytic Integration:

Potential integrals for uniform and linear source distributions on polygonal and polyhedral domains
Antennas and Propagation, IEEE Transactions on
Volume: 32, Issue: 3, Publication Year: 1984, Page(s): 276 - 281

• 7 point Gaussian Quadrature Integration:

weight=[0.225 0.13239415278851 0.13239415278851 0.13239415278851 0.12593918054483 0.12593918054483 0.12593918054483];
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