Intensively Computational Electromagnetic Tecniques for the Analysis of Complex Communication Devices

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Outline

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1. Introduction
   - Generalities
   - Objectives of the talk
2. Theory
   - Integral equation with free-space Green's functions
   - Integral equation with complex Green's functions
3. Results - Two applications
   - Shielded Microwave Filter
   - Fields Calculation for Multipactor Analysis
4. Conclusions

Motivation

- Computer Aided Design Systems (CAD) Tools are very important to cope with the increasing complexity of communication systems.
- CAD tools can decrease development time and cost, by reducing experimental work.
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Numerical approach

- ☞ Faster and larger computers.
- ☞ Parallel computation to exploit the computational capabilities of the machines.
- ☞ Research into numerical routines to invert faster larger systems (iterative solvers, etc.).

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Cavity Green's functions

- ☞ More intelligent Kernel.
- ☞ The enclosure and dielectric substrates are already included in the Kernel.
- ☞ Numerical solution is reduced

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- ☞ Only exponential functions are involved.
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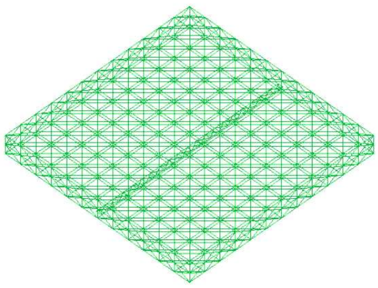

3D View

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- Green's functions do not contain information on dielectric substrates.
- For printed structures the dielectrics must also be discretized, either in volume (VIE) or in surface (SIE).
- Huge systems of linear equations must be solved fast.

Integral equation with free-space Green's functions

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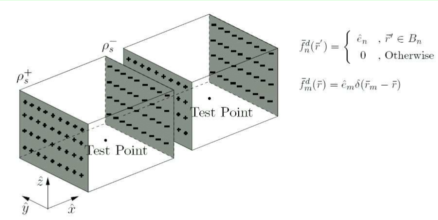

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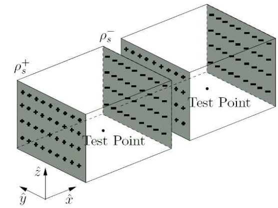
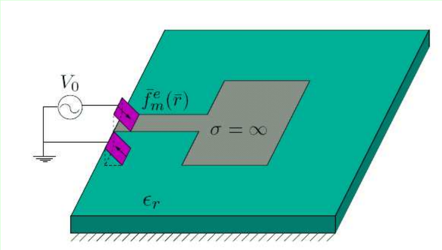


$$\bar{f}_n^d(\bar{r}') = \begin{cases} \hat{e}_n & , \bar{r}' \in B_n \\ 0 & , \text{Otherwise} \end{cases}$$

$$\bar{f}_m^d(\bar{r}) = \hat{e}_m \delta(\bar{r}_m - \bar{r})$$



Integral equation with complex Green's functions

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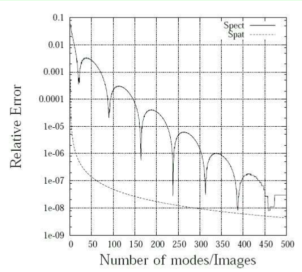

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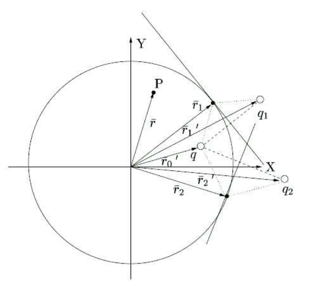

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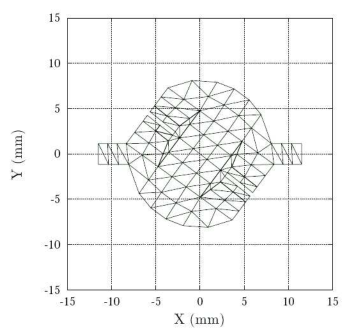

Design of Shielded Microwave Filters

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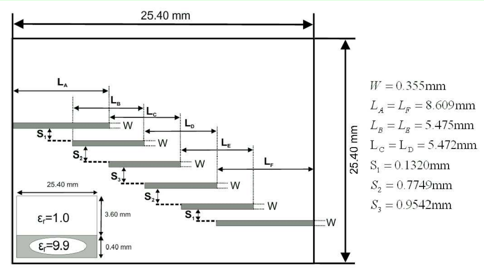

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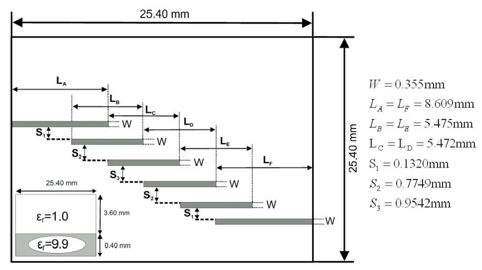

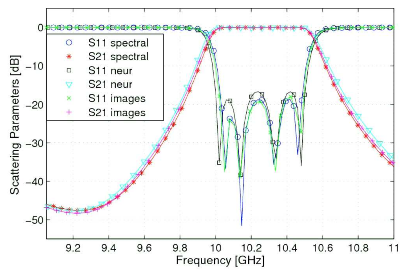

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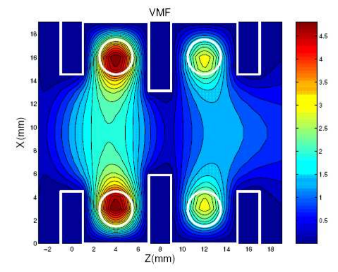

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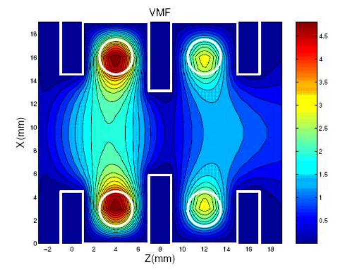

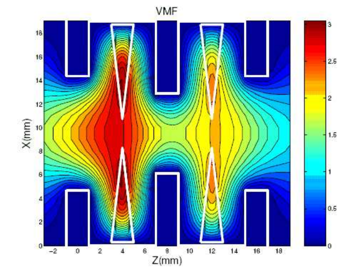

Conclusions

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