

DTG3F3
Teknik Antena
dan propagasi



Antenna Design Software

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Contents



1

Pendahuluan

2

Klasifikasi Computational Electromagnetic

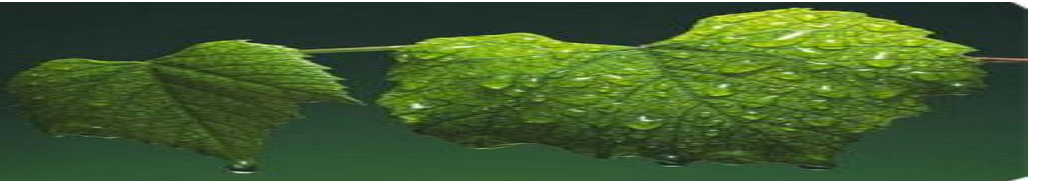
3

Commercial Antenna Designer

4

Commercial Antenna Designer

Where are We ?



PENDAHULUAN



Klasifikasi Computational Electromagnetic

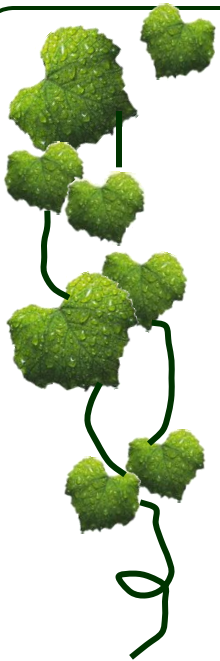


Numerical Method



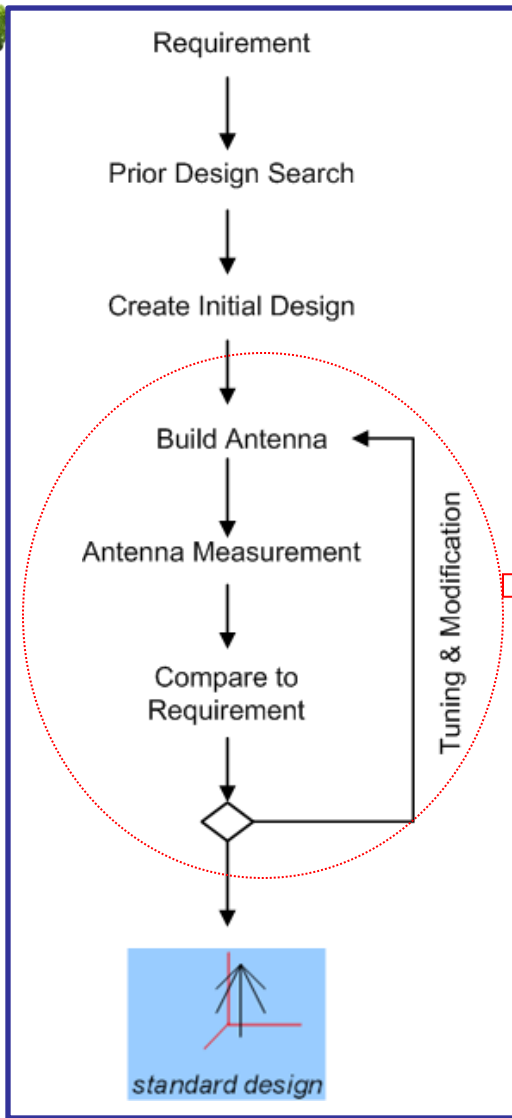
Commercial Antenna Designer

Background



- ❑ Antenna design is a very challenging subject since there are usually many variables involved.
- ❑ The prediction of antenna performance is a very complex issue and the analytical approach is only suitable for antennas of simple geometry.
- ❑ Trying error – experimental method was a very expensive and time-consuming procedure.

Antenna Design Procedure

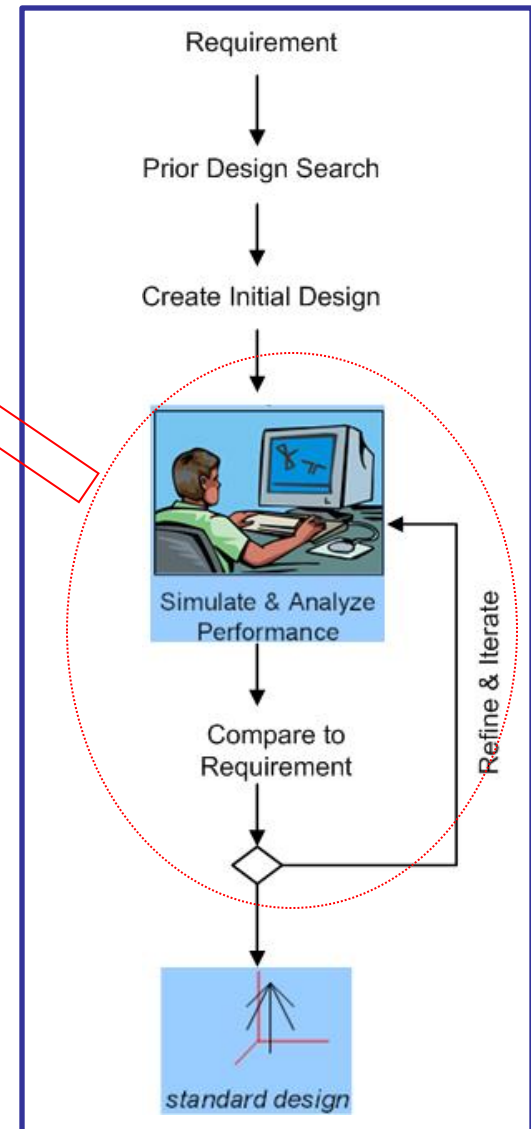


Past

The performance goals can be tested before any actual antenna is constructed

- ❑ very expensive and time consuming procedure.
- ❑ A good understanding of antennas and impedance-matching theory and techniques were required
- ❑ good analytic mathematical background were required

Recent

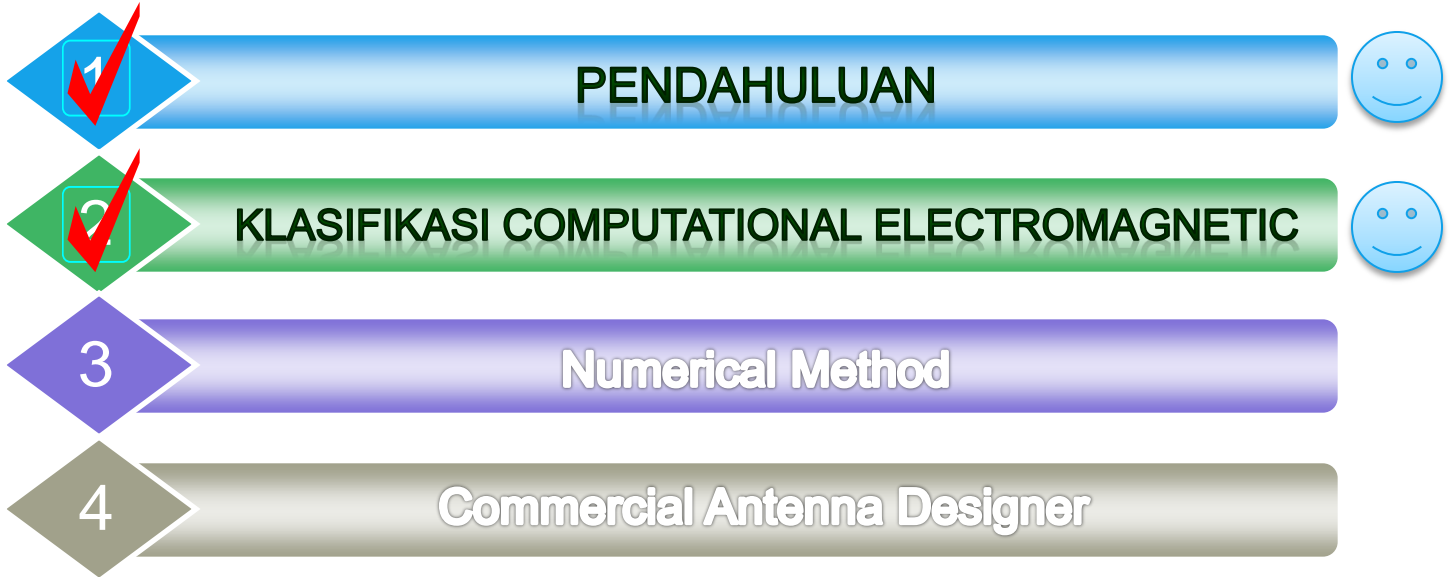
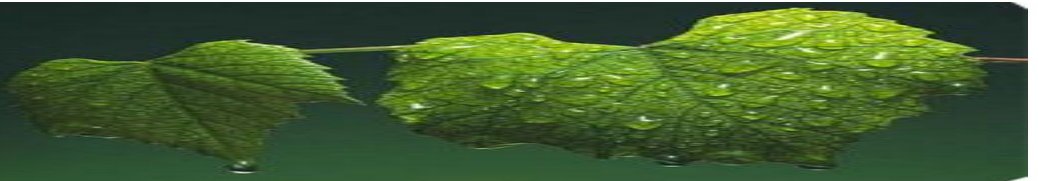


History of Antenna Design Software



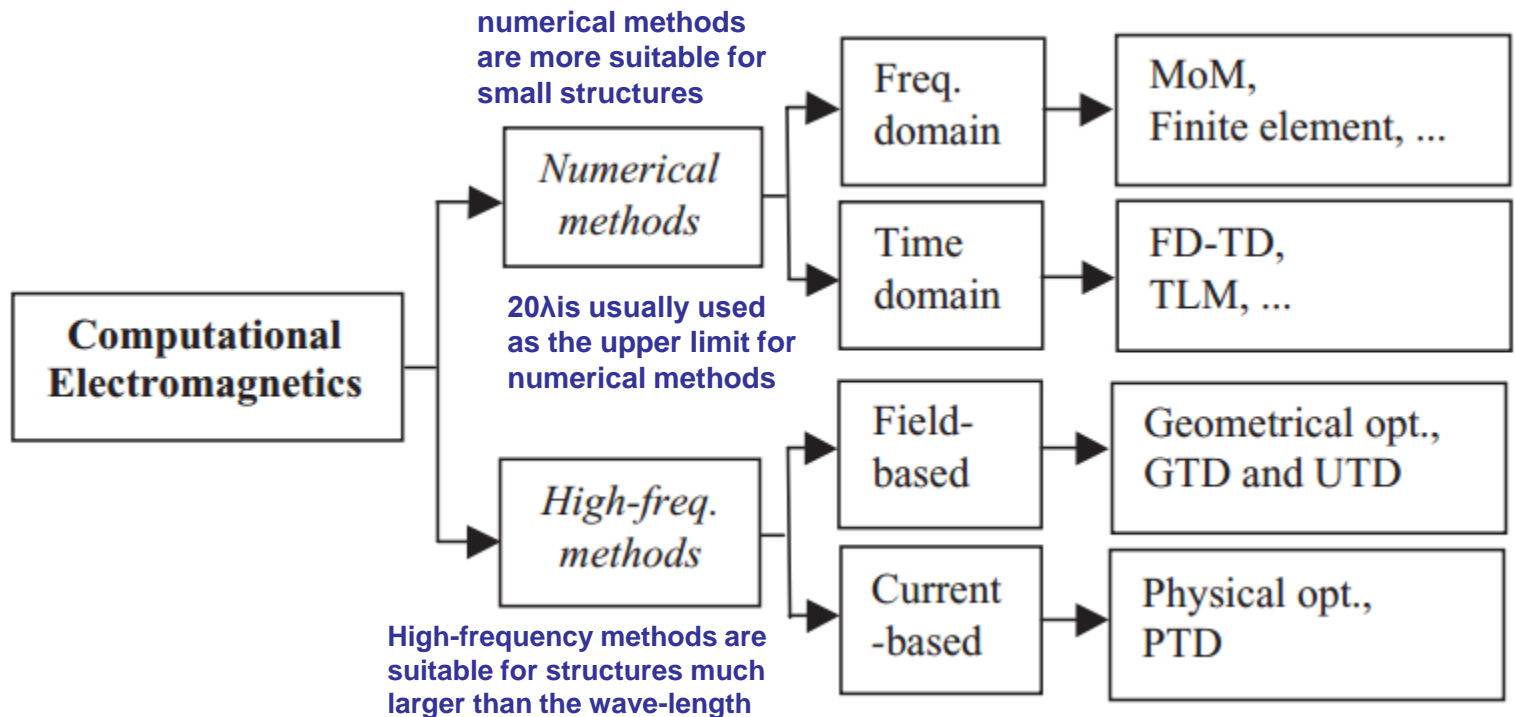
- ❑ **In the mid-1960s**, mainframe computers were finally fast enough to conduct antenna modeling. However, it still required an astute antenna design engineer with a good analytic mathematical background to write the equations and computer programs to model antennas
- ❑ **In the 1970s**, the Numerical Electromagnetic Code (NEC) program was developed using FORTRAN (a computer computational program) by the US government. This program was accurate and suitable for wire-type antennas but difficult to use and required a large mainframe computer. Furthermore, its use was restricted by the government
- ❑ **in the mid-1980s** when personal computers (PCs) became widely available, there were several antenna-modeling programs available. The primary one was MININEC, a smaller program based on NEC that ran fast on a PC. As PCs increased in speed, so did the antenna-modeling programs.
- ❑ **In the 1990s**, a large number of EM simulation tools and antenna design software packages, based on various methods, were developed and appeared on the market. They are suitable not only for wire-type antennas but also aperture-type antennas. Many of these packages have been updated every one or two years

Where are We ?



Klasifikasi Computational Electromagnetic (CEM) for Antenna

- Computational electromagnetics (CEM) is a unique subject of interest to all electromagnetics engineers and researchers. It has a very wide range of applications in RF engineering, EMC, radar, wireless communications, electrical and electronic engineering, and extends to areas such as biomedical engineering – **antennas are just one of the areas**

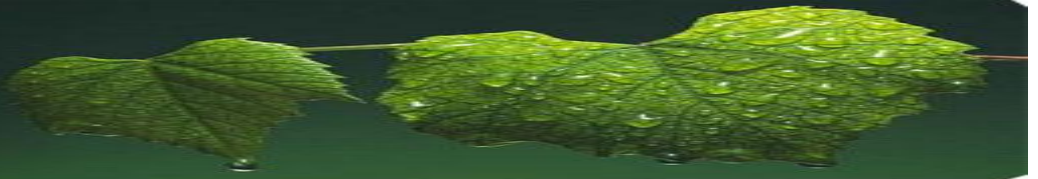






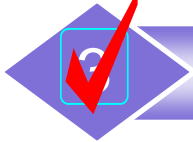


Comparison of the time and frequency domain methods



	Frequency domain methods		Time domain methods	
	MoM	FEM	FDTD	TLM
<i>Advantages</i>	Fast at single frequency; Easily combined with other methods to deal with large problems.		Broadband results in one simulation; Good for pulse-type problems.	
<i>Disadvantages</i>	Difficult to deal with pulse-type problems;		Not suitable for electrically large systems	
<i>Note</i>	Most suitable for wire-type antennas	Be careful with very thin wires	Be careful with the boundary conditions	Be careful with thin wires

Where are We ?



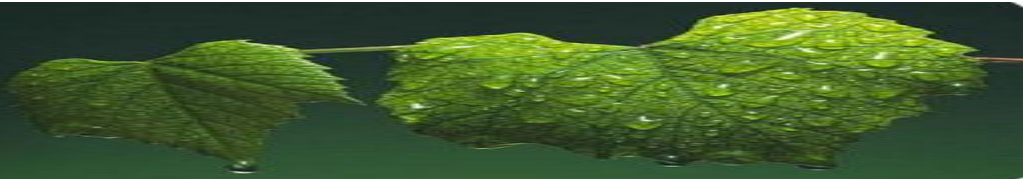
-  **PENDAHULUAN** 
-  **KLASIFIKASI COMPUTATIONAL ELECTROMAGNETIC** 
-  **COMMERCIAL ANTENNA DESIGNER** 
-  **Commercial Antenna Designer**

Commercial Antenna Designer

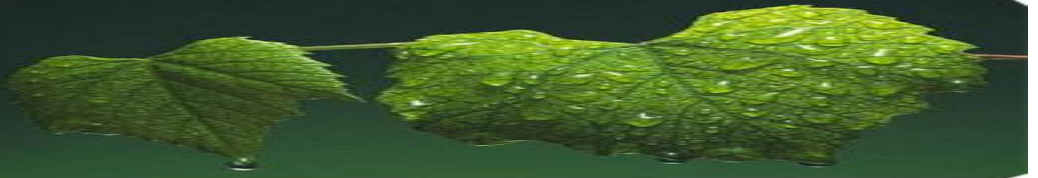


- ❑ A large number of electromagnetic modeling software packages have been developed and are available on the market, Some are more successful technically and commercially than others, Some have become industrial standard design and analysis software
- ❑ Some Commercial Antenna Designer :
 - MoM-based (EZNEC, MININEC, Momentum, IE3D, ADS)
 - FDTD-based (XFDTD, Empire)
 - FIT-based (CST Microwave Studio)
 - FEM-based (HFSS)
 - Hybrid MoM/UTD-based (FEKO)
 - TLM-based (MicroStripes)

Referensi



- ❑ **ANTENNAS FROM THEORY TO PRACTICE**, Yi Huang, Kevin Boyle
- ❑ **A Practical Guide to 3D Electromagnetic Software Tools** Guy A. E. Vandenbosch and Alexander Vasylychenko



Questions???





Thank You !

