RELATION BETWEEN FIELD THEORY AND CIRCUIT THEORY AND APPLICATIONS OF MAXWELL'S EQUATION

Relation between field theory and circuit theory

Circuit Theory:

1) This analysis is originated by its own.
2) Applicable only for portion of radiofrequency range.
3) It is dependent and independent parameter, I and V are directly obtained from the given circuit.
4) Parameters of medium are not involved.
5) Laplace Transform is employed.
6) Z, Y and H parameters are used.
7) Low power is involved.
8) Simple to understand.
9) 2 Dimensional analysis.
10) Frequency is used for reference.
11) Lumped components are used.

Field Theory:

1) Evolved from transmission ratio.
2) Not applicable for portion of radiofrequency range.
3) Not directly obtained from E and H.
4) Parameters (Permeability and Permitiviy) are analysed in the medium.
5) Maxwell's equation is used.
6) S parameter is used.
7) High Power is involved.
8) Needs visualisation effect.
9) 3 Dimensional analysis.
10) Wavelength is used as reference.
11) Distributed components are used.

Applications

The uses and applications of Maxwell's equations are just too many to count. By understanding electromagnetism we're able to create images of the body using MRI scanners in hospitals; we've created magnetic tape, generated electricity, and built computers. Any device that uses electricity or magnets is on a fundamental level built upon the original discovery of Maxwell's equations.

While using Maxwell's equations often involves calculus, there are simplified versions of the equations we canstudy. These versions only work in certain circumstances, but can be useful and save a lot of trouble. Let's lookat one of these - the simplified version of Faraday's law.

As a reminder, Faraday's law says that any change to the magnetic environment of a coil of wire will cause a voltage to be induced in the coil. And we can quantify those changes in a simple equation. Doing so gives youthis equation below, where N is the number of turns on the coil of wire, delta BA is the change in the magneticfield times the area of the coil of wire, and delta t is the time over which that change occurs.