Electromagnetics

University Electrical Engineering · Vocabulary in context

Word	Example
electromagnetics	**Electromagnetics** explains the fields around circuits and antennas.
divergence /daɪˈvɜːdʒəns/	Positive **divergence** means more field flows out than in.
curl /kɜːl/	Zero **curl** means no local circulation in the field.
Gauss's law /ˈgaʊsɪz lɔː/	**Gauss's law** links the electric field through a closed surface to the charge inside.
potential /pəˈtenʃl/	Electrostatic **potential** differences are independent of the path taken.
capacitance /kəˈpæsɪtəns/	A large capacitor has a large **capacitance**.
boundary conditions	The **boundary conditions** tell us how fields change at the edge between two materials.
Biot-Savart law	**Biot-Savart law** adds magnetic-field contributions from steady current elements.
Ampere's law	For steady currents, **Ampere's law** links magnetic circulation to enclosed current.
magnetic flux /mægˈnetɪk flʌks/	**Magnetic flux** is the flux density times the area.
inductance /ɪnˈdʌktəns/	Greater **inductance** stores more energy.
Lorentz force	Magnetic **Lorentz force** is perpendicular to the charge's velocity.

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displacement current /dɪˈspleɪsmənt ˈkʌrənt/	A changing electric field contributes **displacement current** between capacitor plates.
plane wave	In free space, a **plane wave** has perpendicular, in-phase E and B. E B
intrinsic impedance	The **intrinsic impedance** of free space is 377 ohms. 377
Poynting vector /ˈpɔɪntɪŋ ˈvektə/	The **Poynting vector** points along the power flow.
skin depth	The **skin depth** in copper at 1 GHz is only 2.1 micrometres. 1 GHz 2.1
good conductor	Wave amplitude decays rapidly inside a **good conductor**.
telegrapher equations	The **telegrapher equations** link voltage and current along a transmission line.
characteristic impedance	**Characteristic impedance** is the voltage-to-current ratio of one travelling wave.
bounce diagram	A **bounce diagram** tracks every reflection up the line.
cutoff frequency /ˈkʌtɒf ˈfriːkwənsi/	Below the **cutoff frequency**, the wave cannot travel down the waveguide.
guide wavelength	The **guide wavelength** is longer than the wavelength in free space.
dipole /ˈdaɪpəʊl/	A lossless half-wave **dipole** has about 2.15 dBi gain. 2.15 dBi
Friis equation	The **Friis equation** predicts how much power a radio receiver picks up.