Electrical Machines and Power Systems

University Electrical Engineering · Vocabulary in context

Word	Example
electrical machines and power systems	**Electrical machines and power systems** cover motors, generators and the power grid.
magnetomotive force	The **magnetomotive force** of 200 turns at 0.5 A is 100 ampere-turns.
flux /flʌks/	For fixed reluctance, doubling magnetomotive force doubles magnetic **flux**.
reluctance	A narrow air gap can dominate an iron core's **reluctance**.
air gap	An **air gap** can greatly increase a magnetic circuit's reluctance.
hysteresis	**Hysteresis** makes core magnetisation depend on its previous magnetic state.
eddy current	Laminations break **eddy current** paths and cut the iron loss.
transformer /træns'fɔːmə/	A **transformer** changes the voltage.
core loss	**Core loss** includes hysteresis and eddy-current losses.
copper loss	For fixed winding resistance, **copper loss** grows with current squared.
open-circuit test	The **open-circuit test** measures a transformer's core loss.

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short-circuit test	A reduced-voltage **short-circuit test** estimates winding loss at rated current.
armature	Rotating **armature** conductors carry current and develop electromagnetic torque.
commutator /ˈkɒmjuːteɪtə/	A DC motor's **commutator** switches connections to maintain unidirectional torque.
shunt motor	A **shunt motor** holds nearly constant speed as load changes.
series motor	A **series motor** must never run without a load.
field weakening	**Field weakening** allows higher motor speed but reduces torque per ampere.
rotating field	Three-phase currents create a **rotating field** that turns the motor.
synchronous speed	A 4-pole 50 Hz winding turns at a **synchronous speed** of 1500 rpm. 4-pole 50 Hz 1500 rpm。
slip	At 1440 rpm with 1500 rpm synchronous speed, **slip** is 4%. 1500 rpm、 1440 rpm 4%
squirrel-cage	A **squirrel-cage** rotor has conducting bars joined by end rings.
wound rotor	A **wound rotor** lets you add resistance for starting torque.
breakdown torque	The **breakdown torque** is the induction motor's maximum steady electromagnetic torque.

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synchronous machine	A **synchronous machine** locks to the grid with zero slip.
power angle	**Power angle** compares the phases of internal EMF and bus voltage. EMF
excitation	Changing **excitation** controls a synchronous generator's reactive-power exchange.
infinite bus	An ideal **infinite bus** holds voltage magnitude and frequency fixed.
static margin	**Static margin** compares operating power with the model's steady-state power limit.
per-unit	A **per-unit** value is the actual quantity divided by its base.
base value	Choose a **base value** for power and voltage before using per-unit values.
fault current	Estimate **fault current** from source voltage and the path's total impedance.
power flow	**Power flow** calculations solve for bus voltages and power transfers.
slack bus	The **slack bus** supplies the power mismatch and fixes reference angle.
reactive compensation	**Reactive compensation** can reduce reactive current and improve voltage regulation.
buck	An ideal **buck** in continuous conduction gives $V_{out}=D\times V_{in}$. $V_{out}=D\times V_{in}$

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boost	An ideal **boost** in continuous conduction gives Vout=Vin/(1−D). Vout=Vin/(1−D)。
duty cycle	**Duty cycle** is switch on-time divided by the switching period.
continuous conduction	In **continuous conduction**, inductor current remains above zero throughout each cycle.
volt-second balance	**Volt-second balance** means an inductor's average voltage is zero over one cycle.
synchronous rectification	**Synchronous rectification** uses controlled transistors instead of rectifier diodes.

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