ECE 404-TD / 504-TD

ST: T&D APPLICATIONS OF VOLTAGE SOURCE CONVERTERS

SESSION no. 1
1) ARMATURE VOLTAGE

2) FIELD CURRENT

\[ T = k \phi_d I_f \]

\[ \phi_d = f(I_f) \]

\[ E_a = K \phi_d \]

\[ E_a = V_a \]
\[ V_i \leq \frac{5^2}{5_i} \]
-12 \pm 20

\begin{align*}
\text{Open:} & \quad \frac{c}{v} = 0 > 0 \\
& \quad v \neq 0, \quad p = 0
\end{align*}

\begin{align*}
\text{Closed:} & \quad \frac{i}{v} = 0 > 0 \\
& \quad v = 0, \quad p = v \cdot i = 0
\end{align*}
Five Basic Concepts of Power Electronics

1. Current through an inductor is continuous.
2. Voltage across a capacitor is continuous.
3. Voltage across an inductor integrates to zero over a complete cycle.
4. Current through a capacitor integrates to zero over a complete cycle.
5. Energy is ALWAYS conserved.
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T & D Applications of Voltage Sourced Converters

Lesson 1

AC waveform:
Amplitude
Frequency
Phase

http://www.powerworld.com/
GloverSarmaOverbye
Version 16

Goals:

1. Introduce power electronic circuits in switch mode
2. Describe and analyze Voltage Sourced Converters: topologies, switching strategies, and control options
3. Apply VSCs to wind turbines, photovoltaics,
HVDC, FACTS, generation, and storage.

4. Model, simulate, and design control for VSCs under normal and abnormal conditions.