

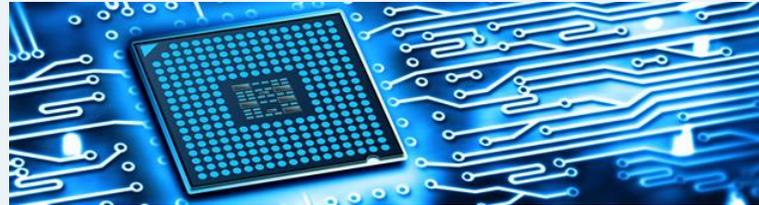


Máquinas Eléctricas

4.º nivel Ingeniería Electromecánica

Docentes: Dr. Ing. Diego M. Ferreyra || Ing. Pablo A. Ferrero

U6. Máquinas especiales y de corriente continua



Máquinas e Instalaciones Eléctricas

4.º nivel Ingeniería Electrónica

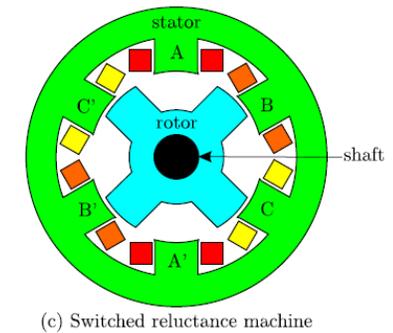
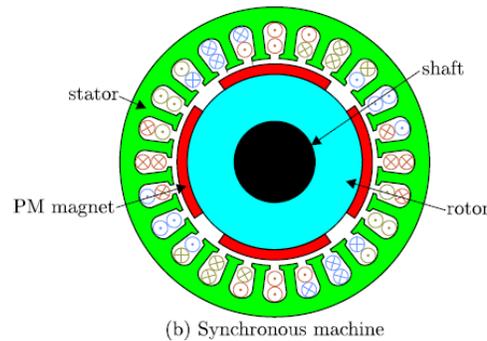
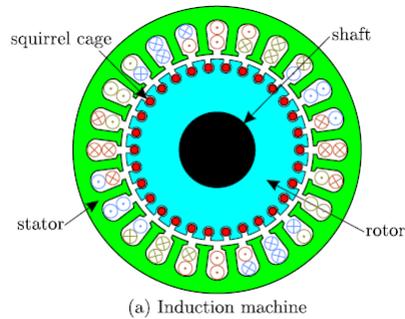
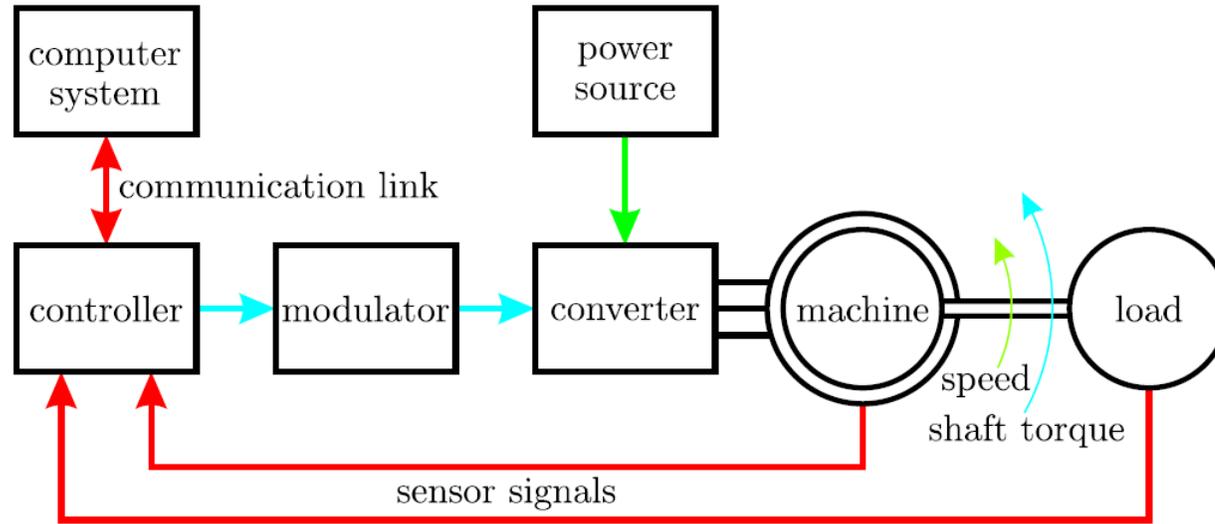
Docentes: Dr. Ing. Diego M. Ferreyra || Esp. Ing. Raúl A. Beinotti

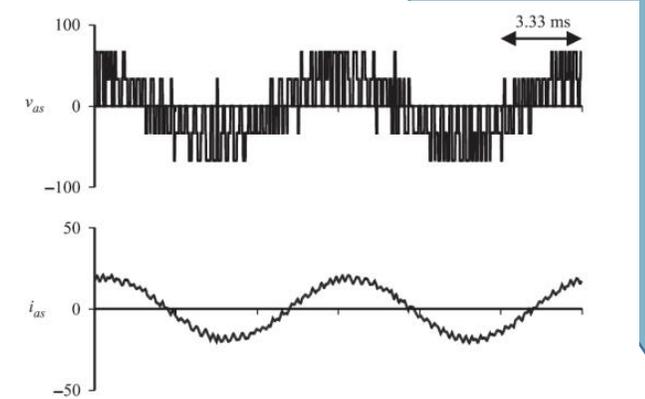
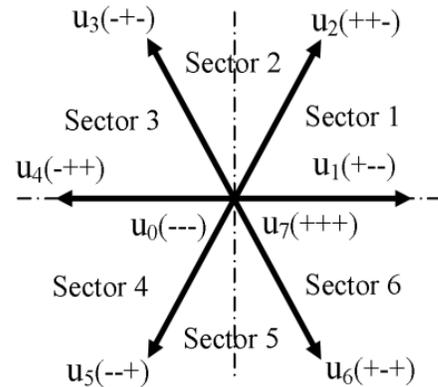
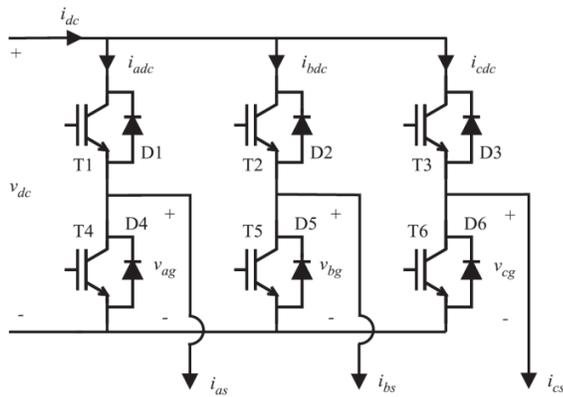
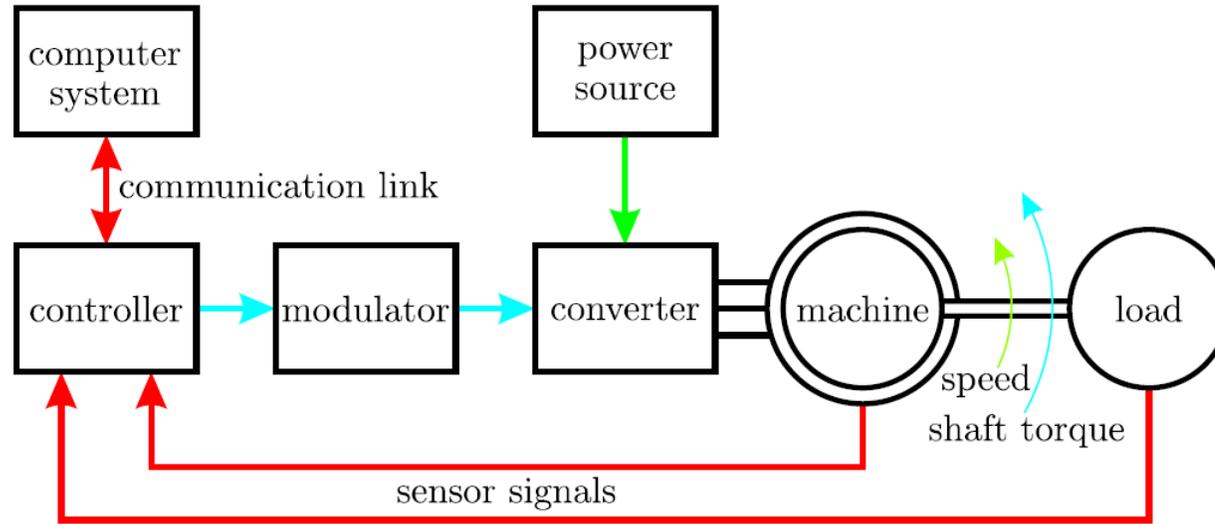
U6. Máquinas de corriente continua y especiales

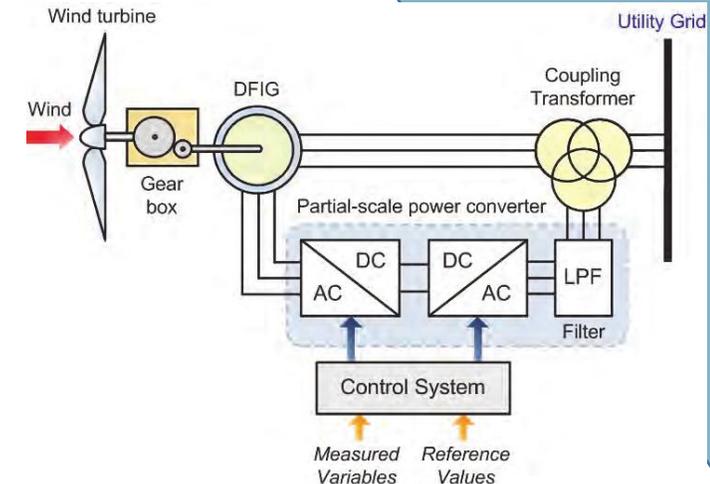
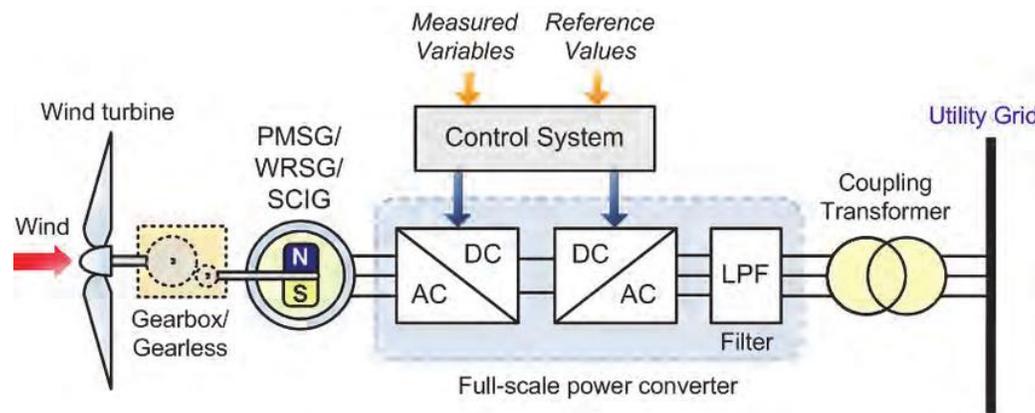
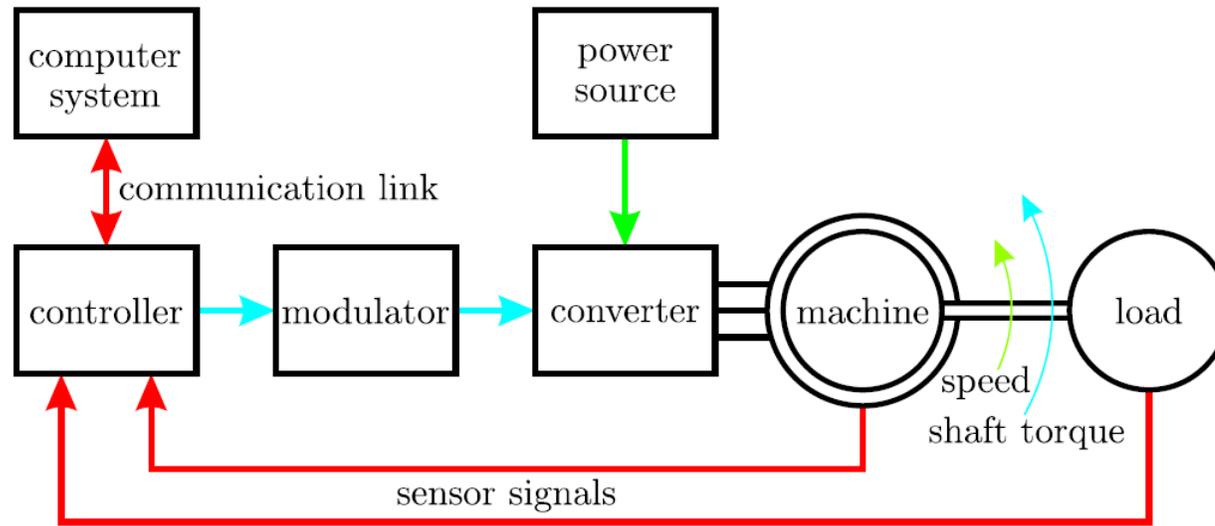
Presentación especial: Convertidores (Rashid, Mohan, etc.)

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REGIONAL
SAN FRANCISCO**



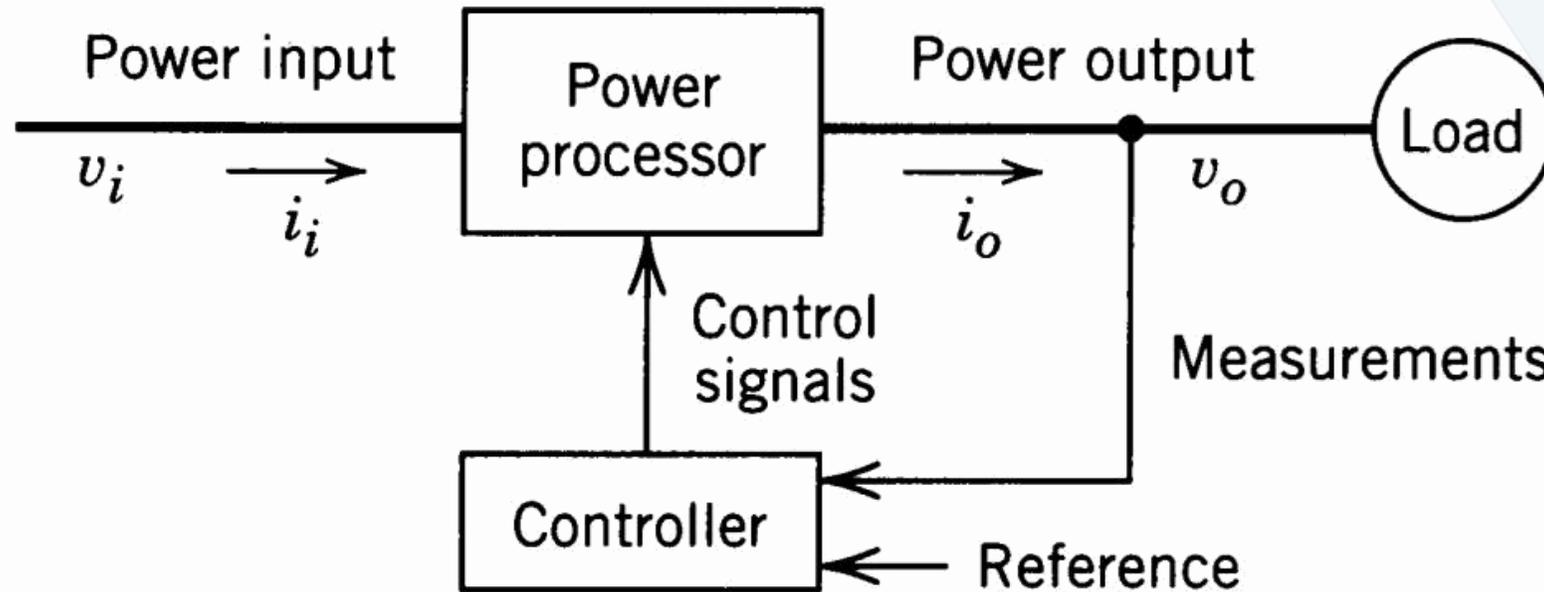




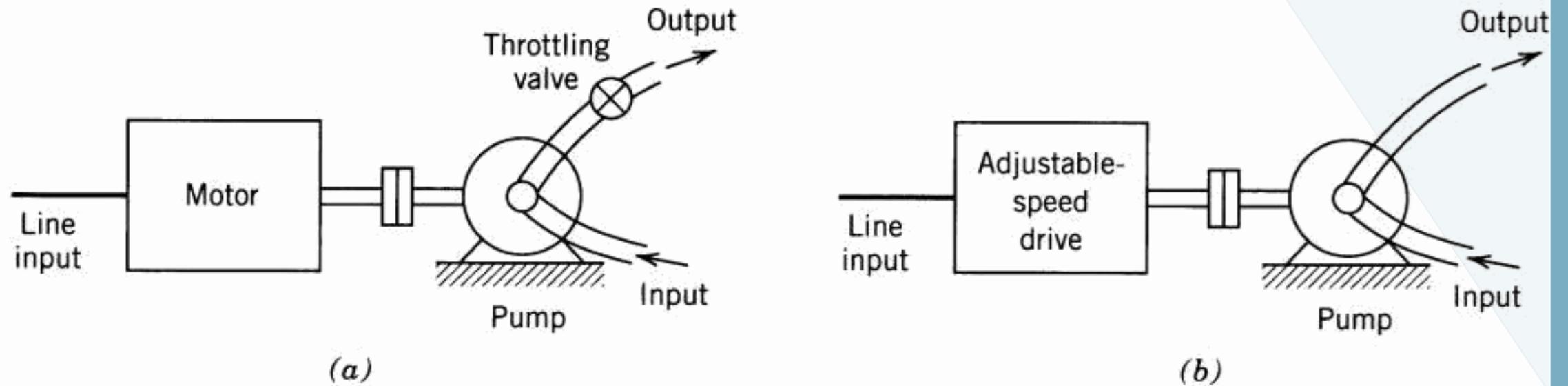
2024

Máquinas Eléctricas (4.º “X”)
Máquinas e Instalaciones Eléctricas (4.º “R”)

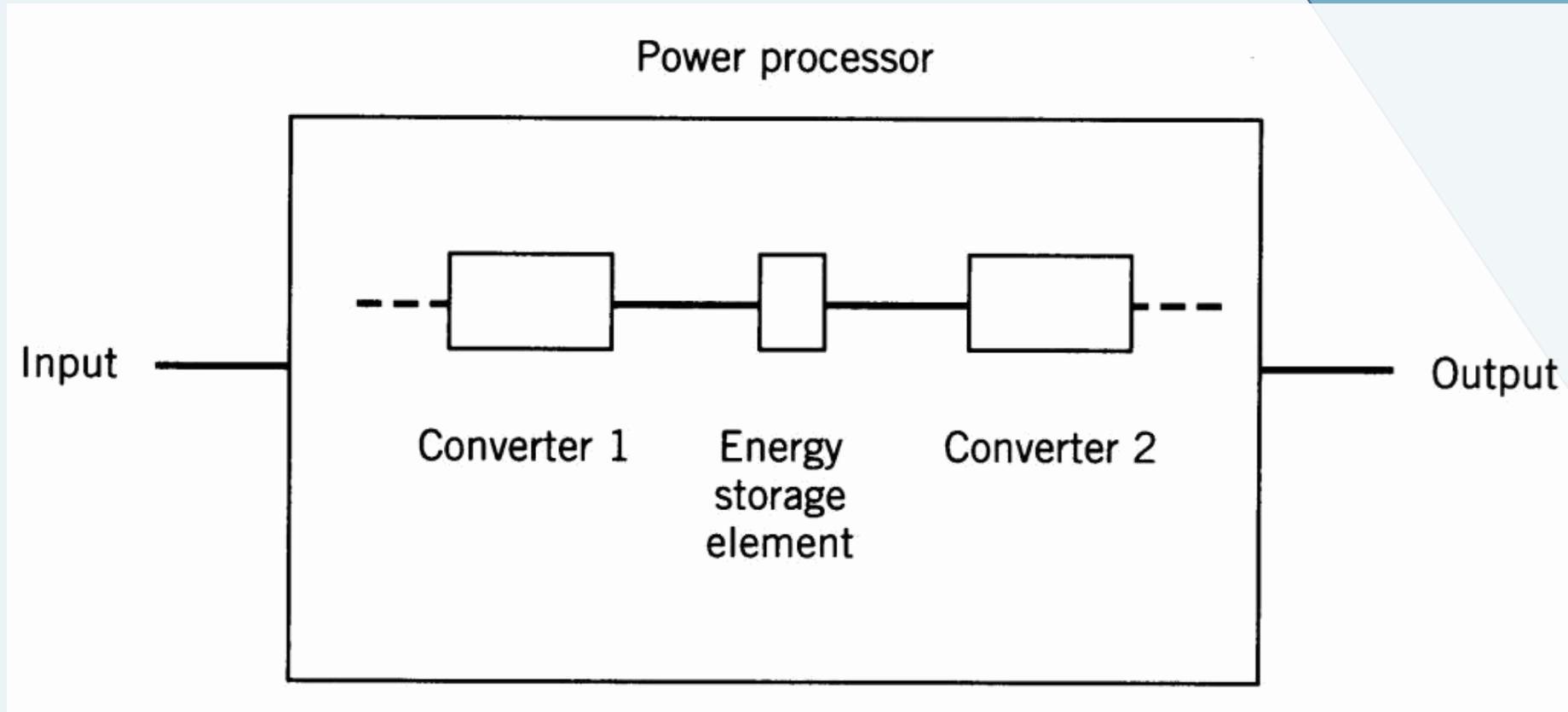
Generalidades sobre convertidores y aplicaciones



Power Electronics 2nd. ed., Mohan (2003)



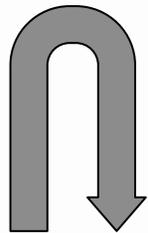
Power Electronics 2nd. ed., Mohan (2003)



Power Electronics 2nd. ed., Mohan (2003)

Conversión

ac-ac



ac

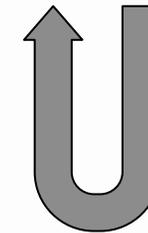
 P 

Rectifier mode



Converter

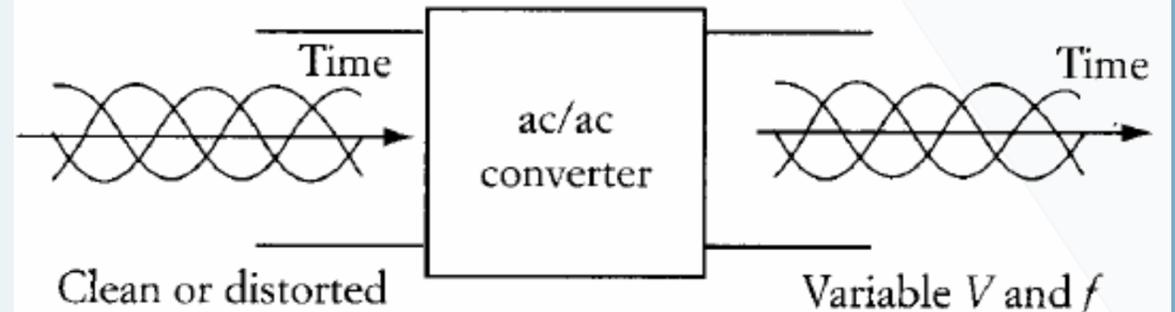
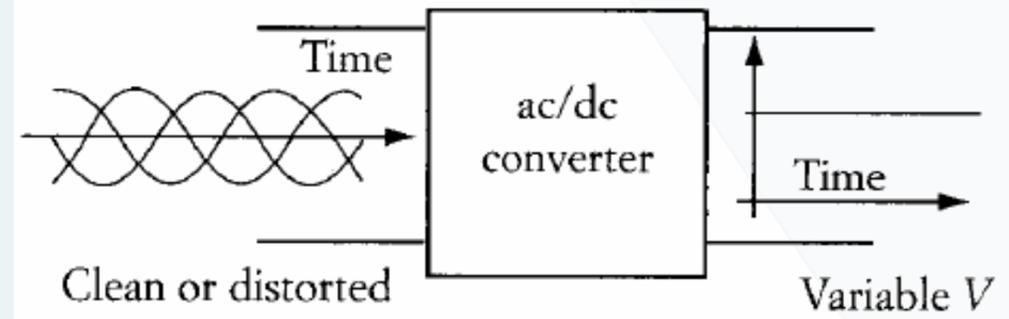
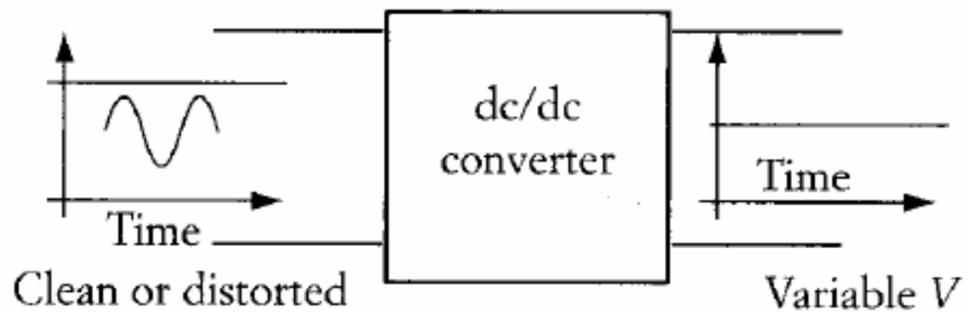
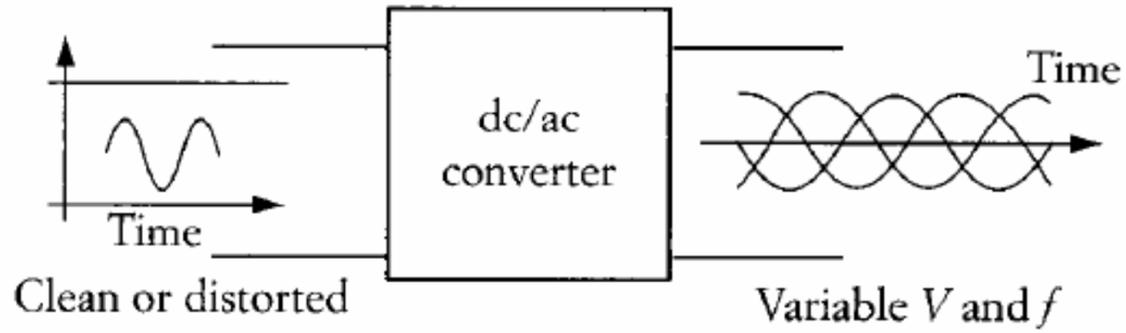
dc



Inverter mode

 P Conversión
dc-dc

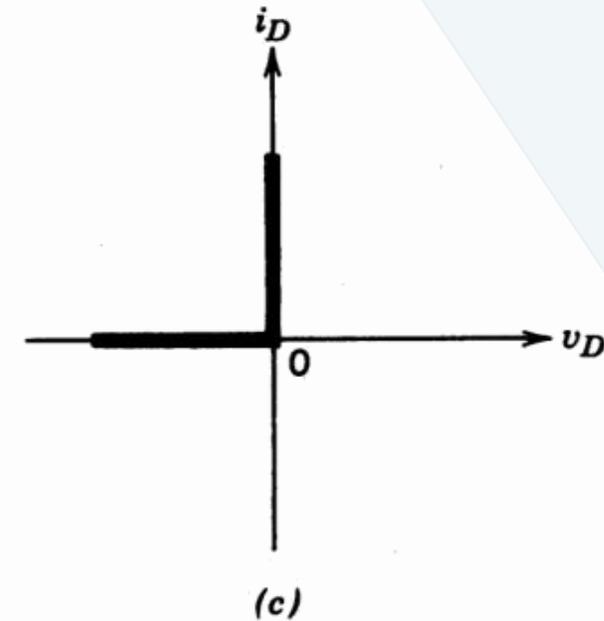
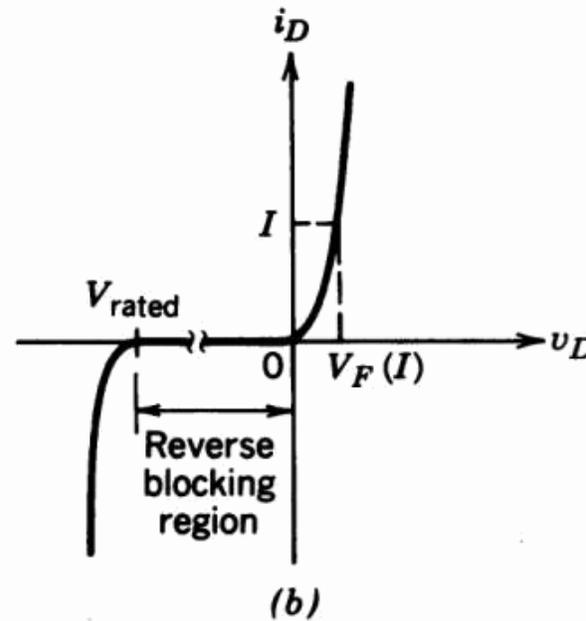
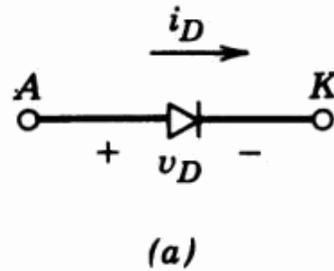
Power Electronics 2nd. ed., Mohan (2003)



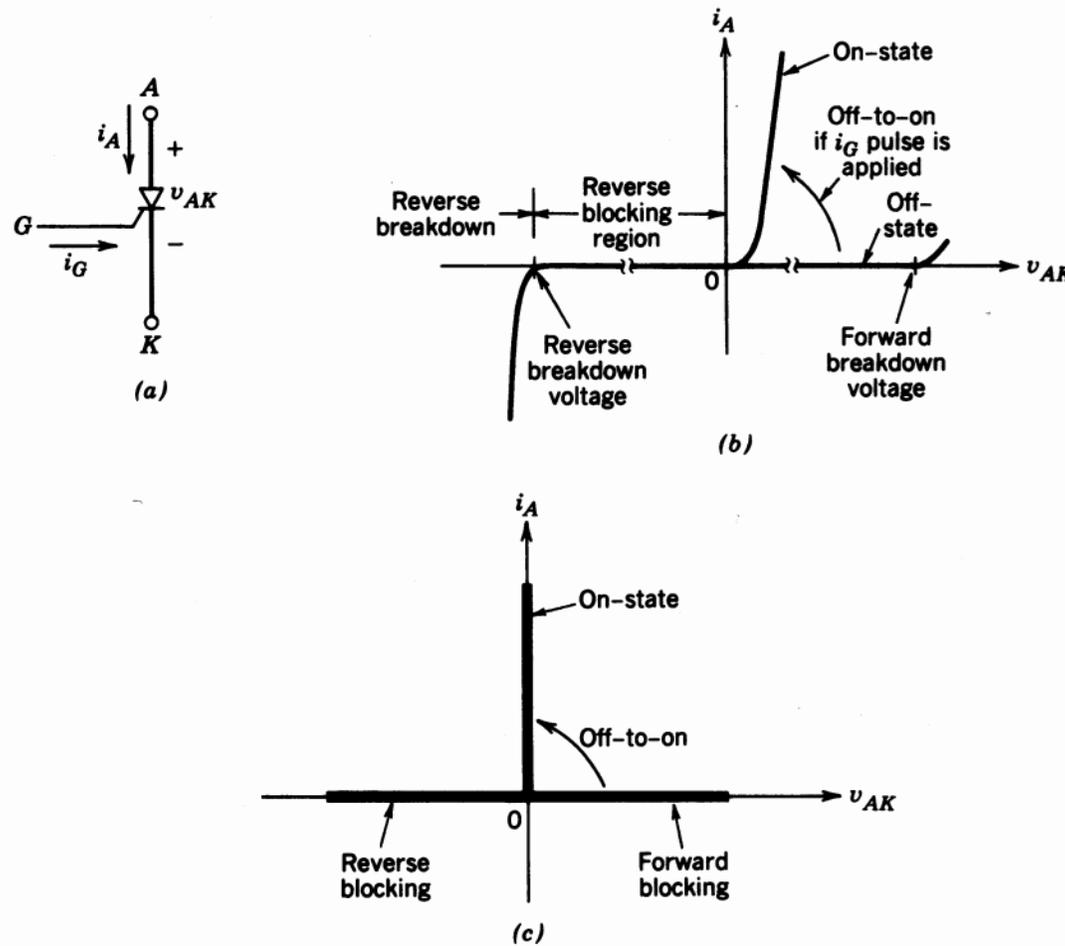
2024

Máquinas Eléctricas (4.º “X”)
Máquinas e Instalaciones Eléctricas (4.º “R”)

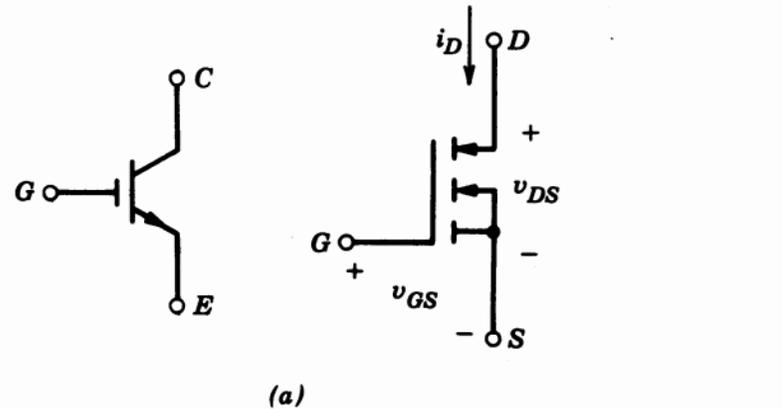
Algunos dispositivos de electrónica de potencia



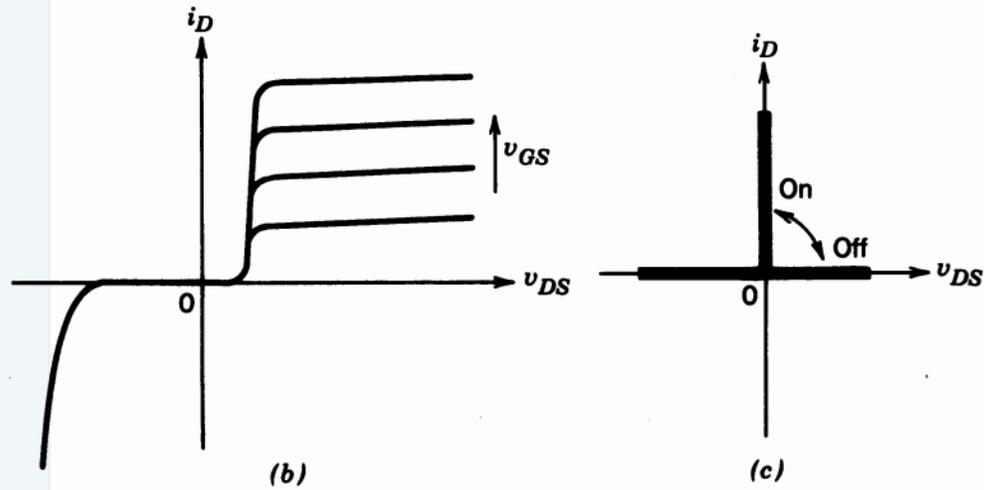
Power Electronics 2nd. ed., Mohan (2003)



Power Electronics 2nd. ed., Mohan (2003)



(a)



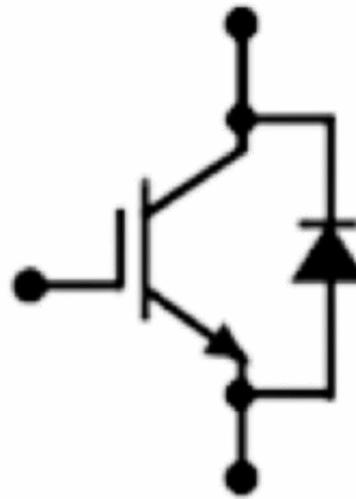
(b)

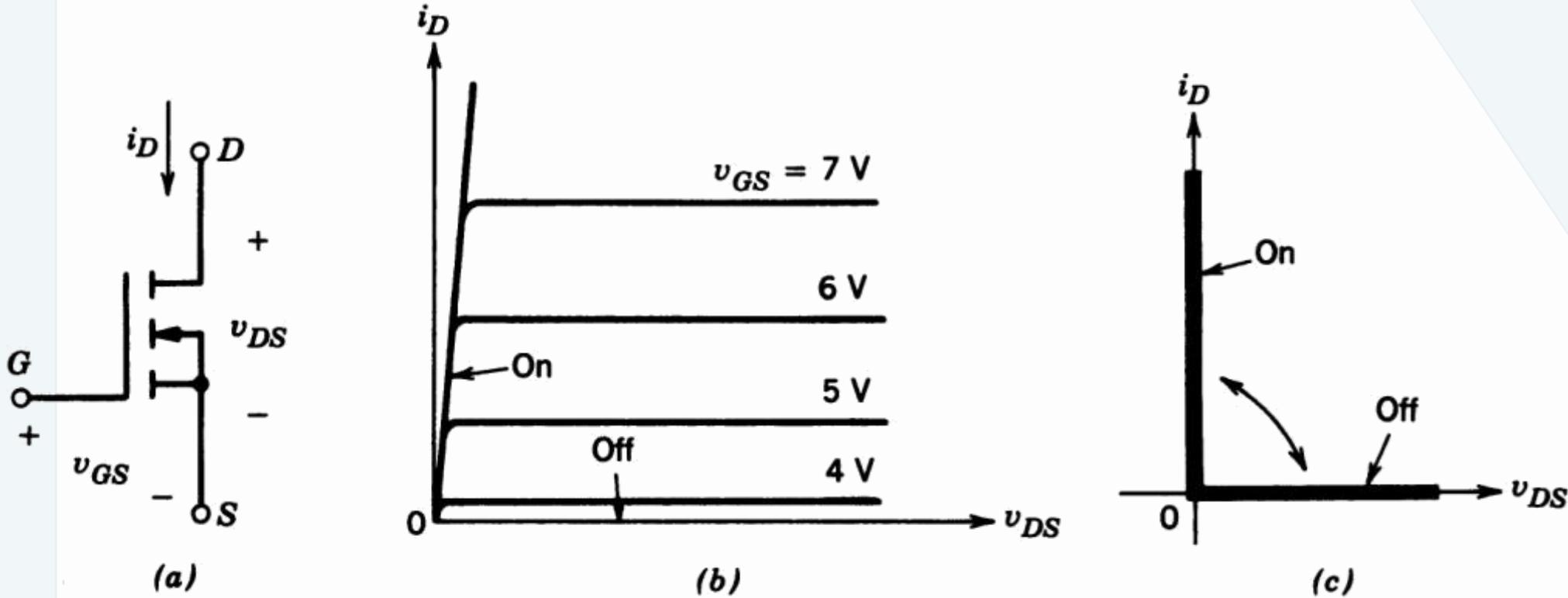
(c)

Power Electronics 2nd. ed., Mohan (2003)

Ejemplo comercial:

https://www.infineon.com/cms/en/product/power/igbt/igbt-modules/ff400r12kt3_e/



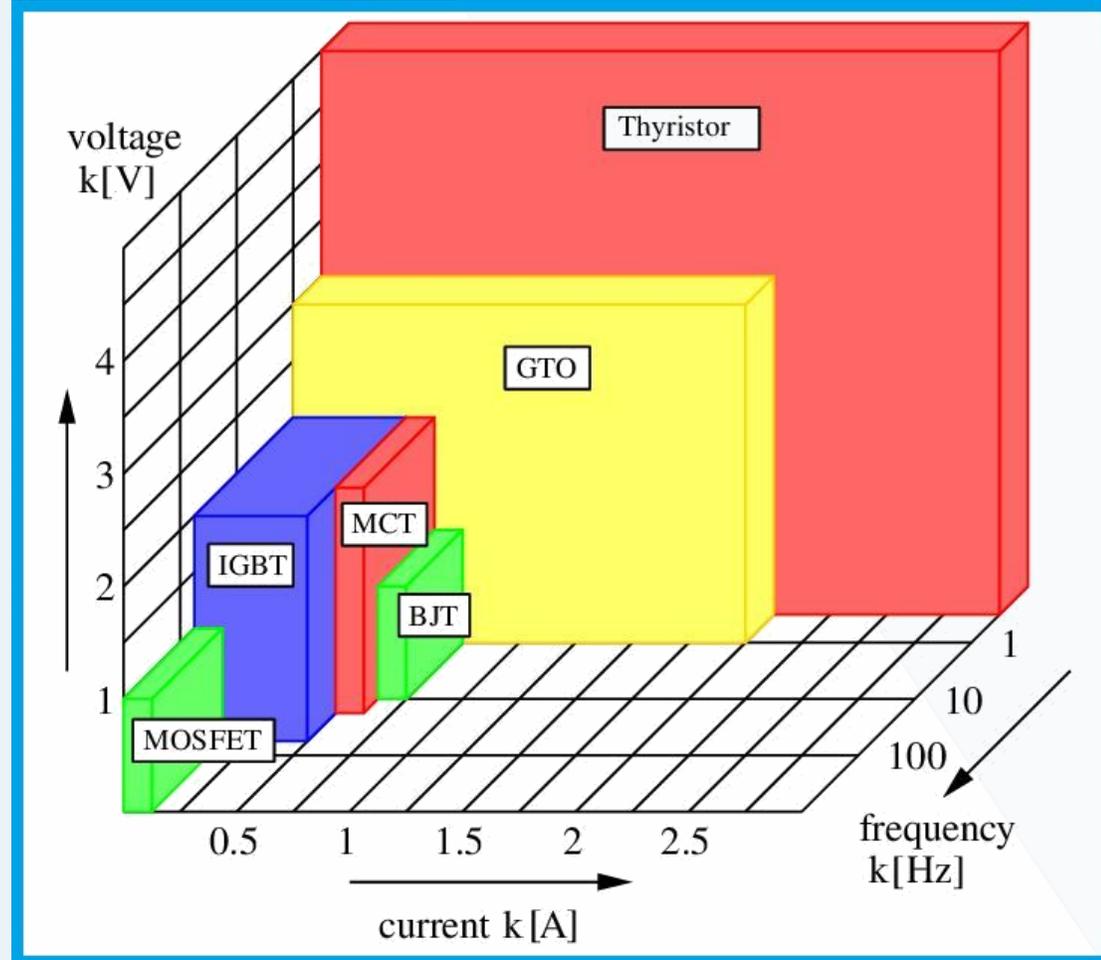
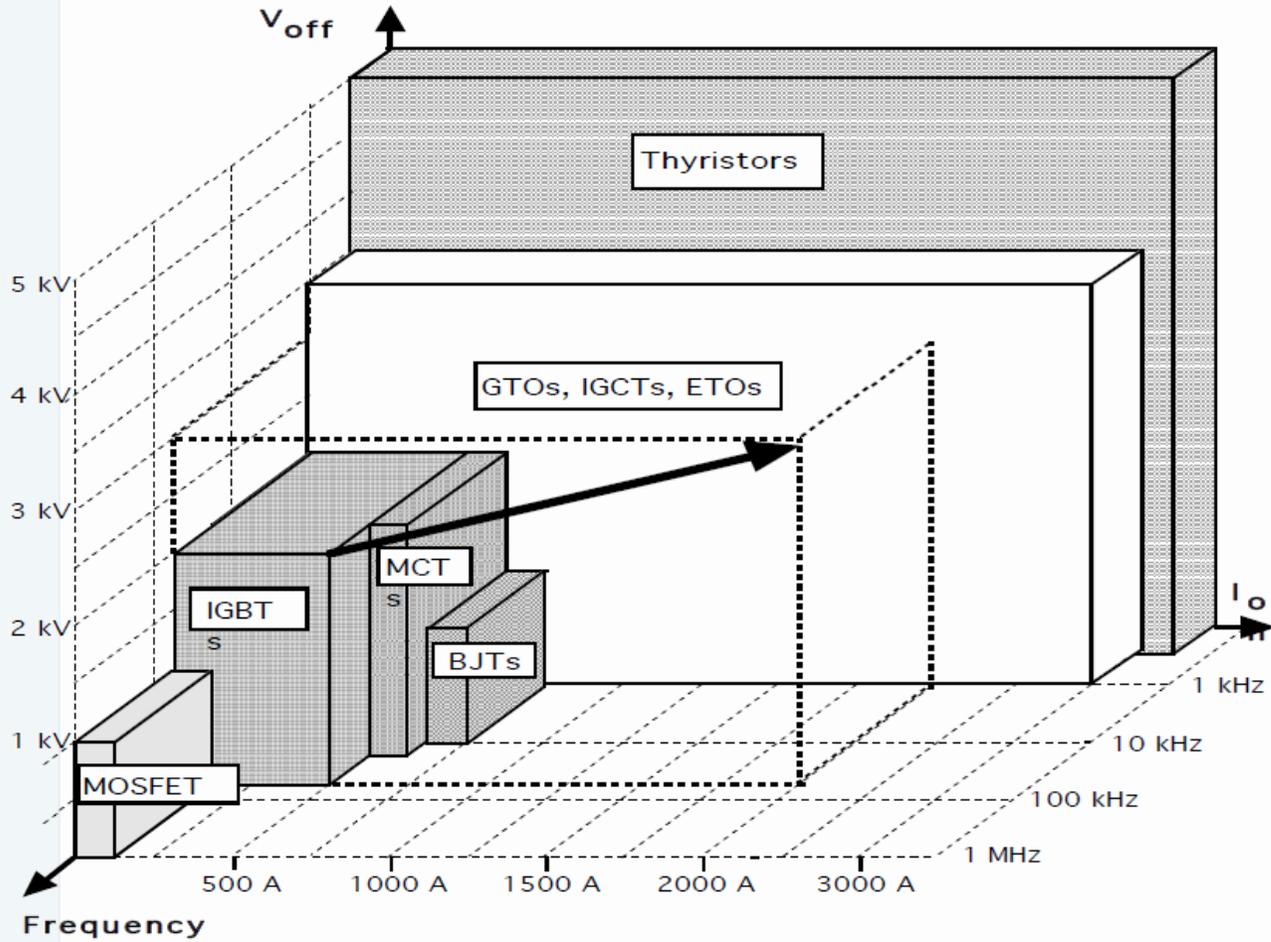


Power Electronics 2nd. ed., Mohan (2003)

Ejemplo comercial:

<https://www.infineon.com/cms/en/product/power/mosfet/n-channel/ipb018n10n5/>

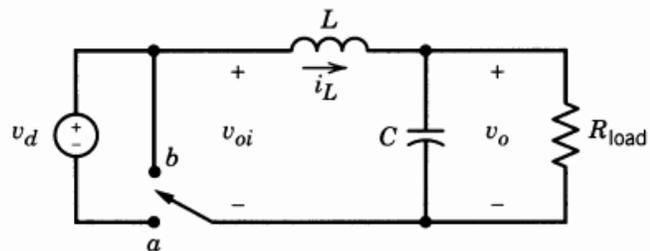




Power Electronics 2nd. ed., Mohan (2003)

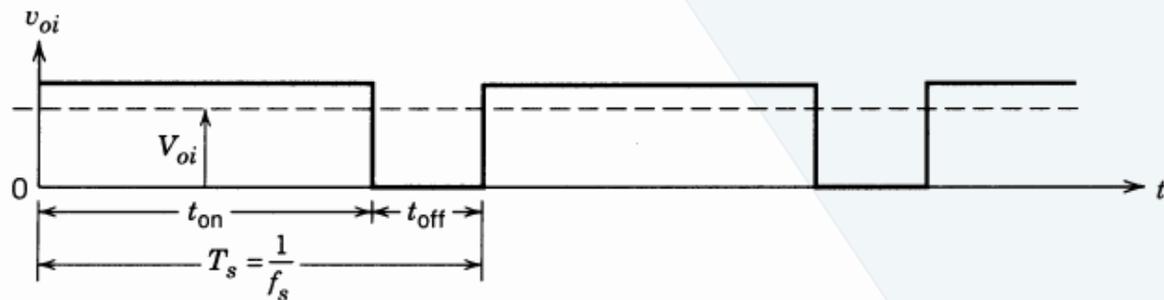
Hossein Asadi (2023) !!!

Rangos aproximados de capacidades (hoy ya extendidas)

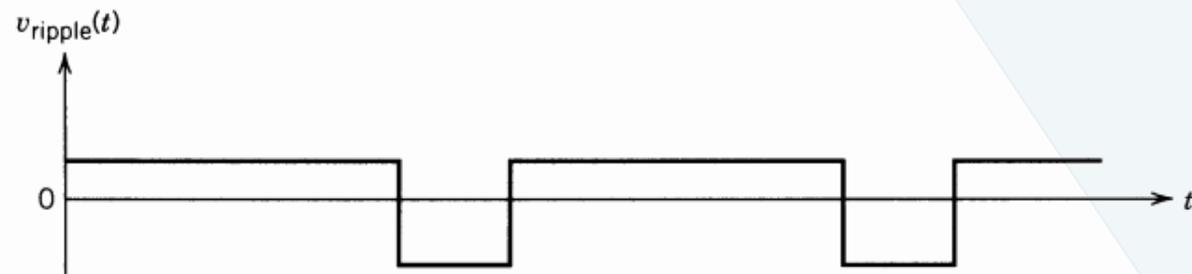


(a)

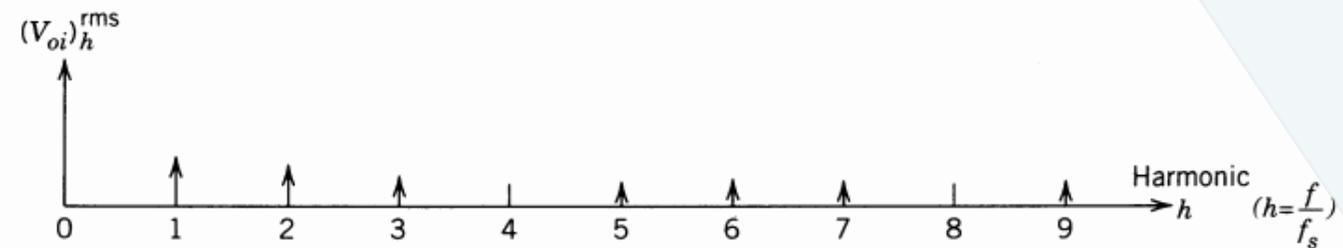
Power Electronics 2nd. ed., Mohan (2003)



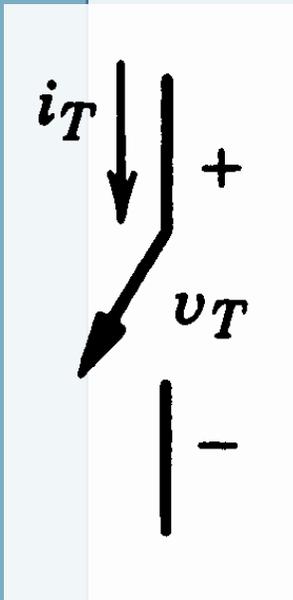
(b)

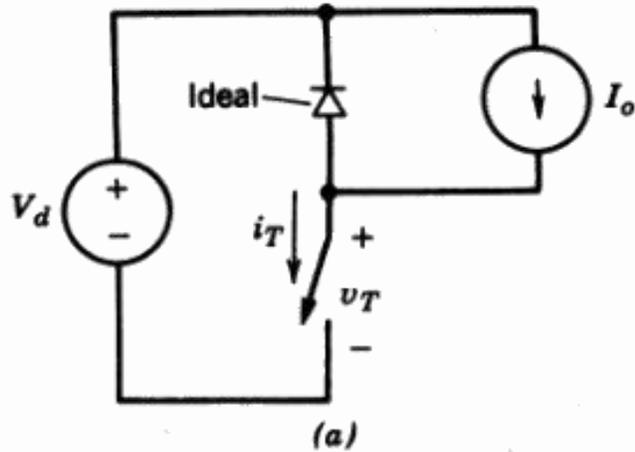


(c)

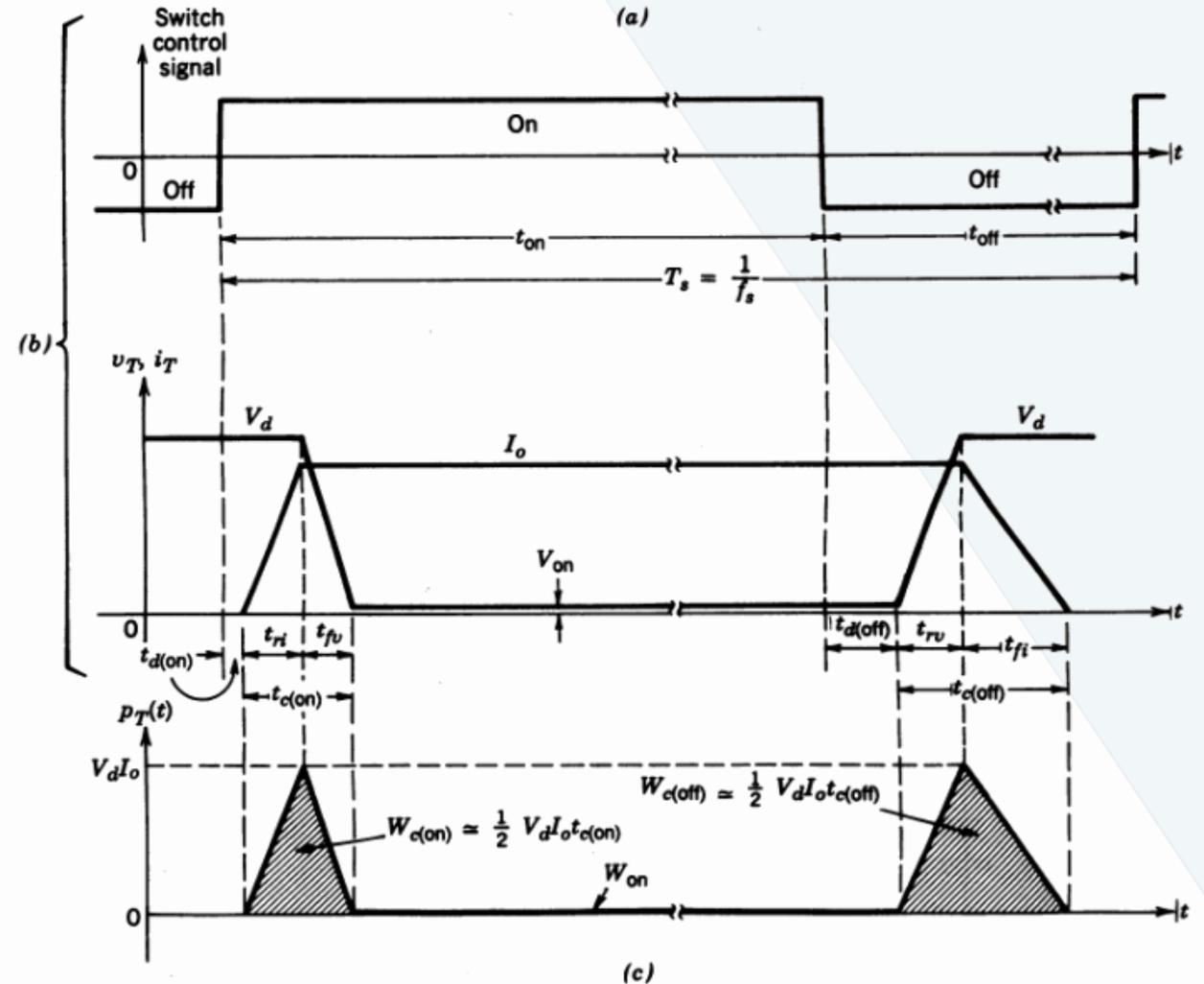
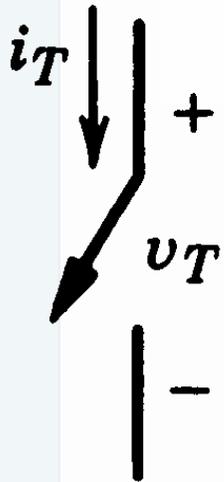


(d)





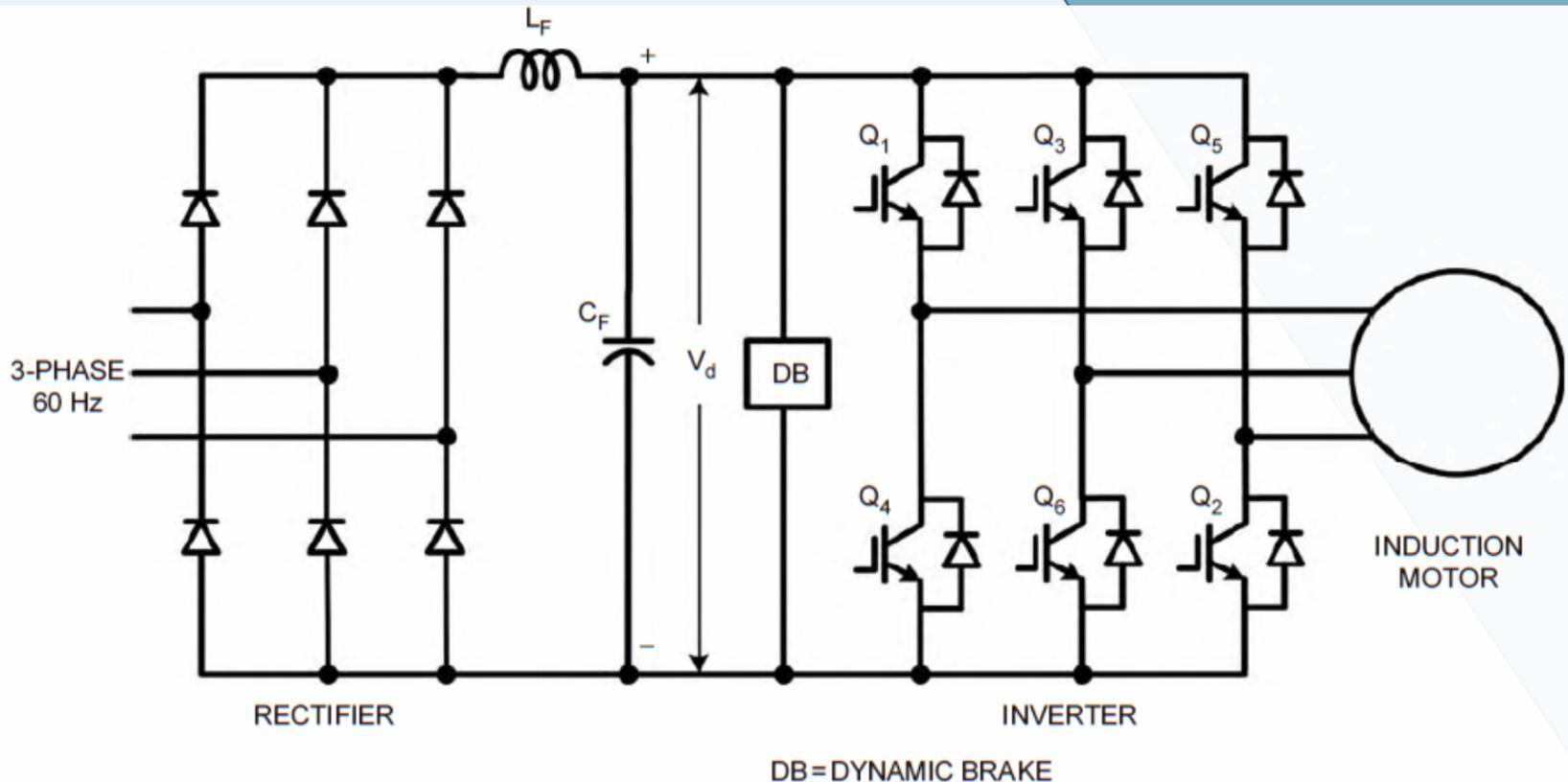
Power Electronics 2nd. ed., Mohan (2003)



2024

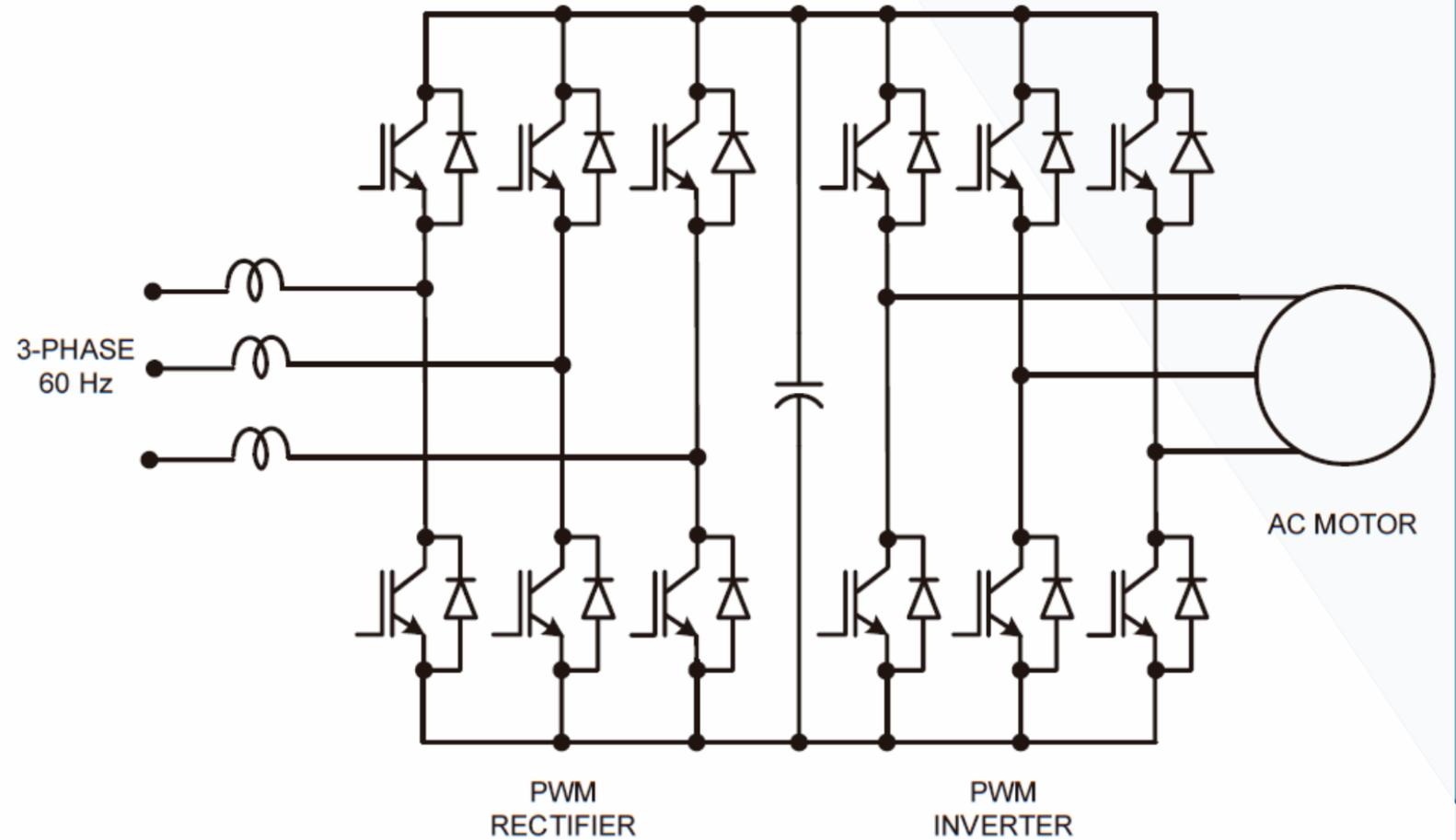
Máquinas Eléctricas (4.º “X”)
Máquinas e Instalaciones Eléctricas (4.º “R”)

Más ejemplos de aplicación



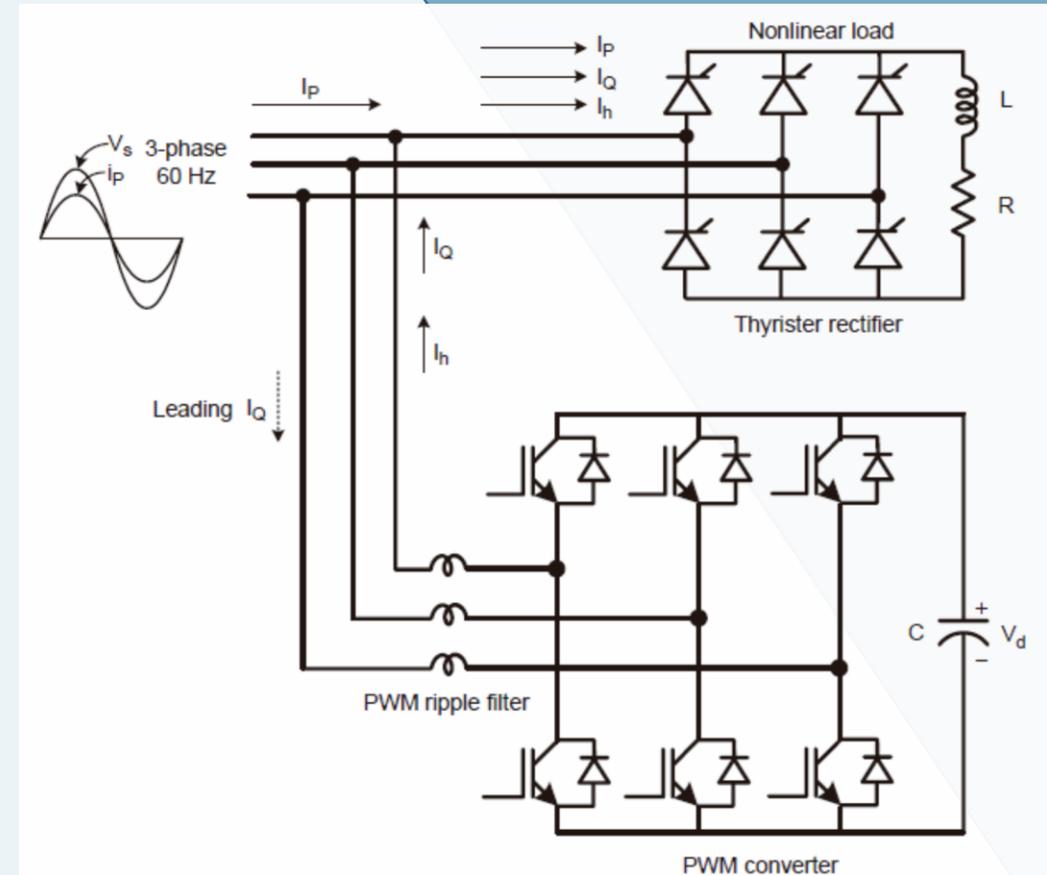
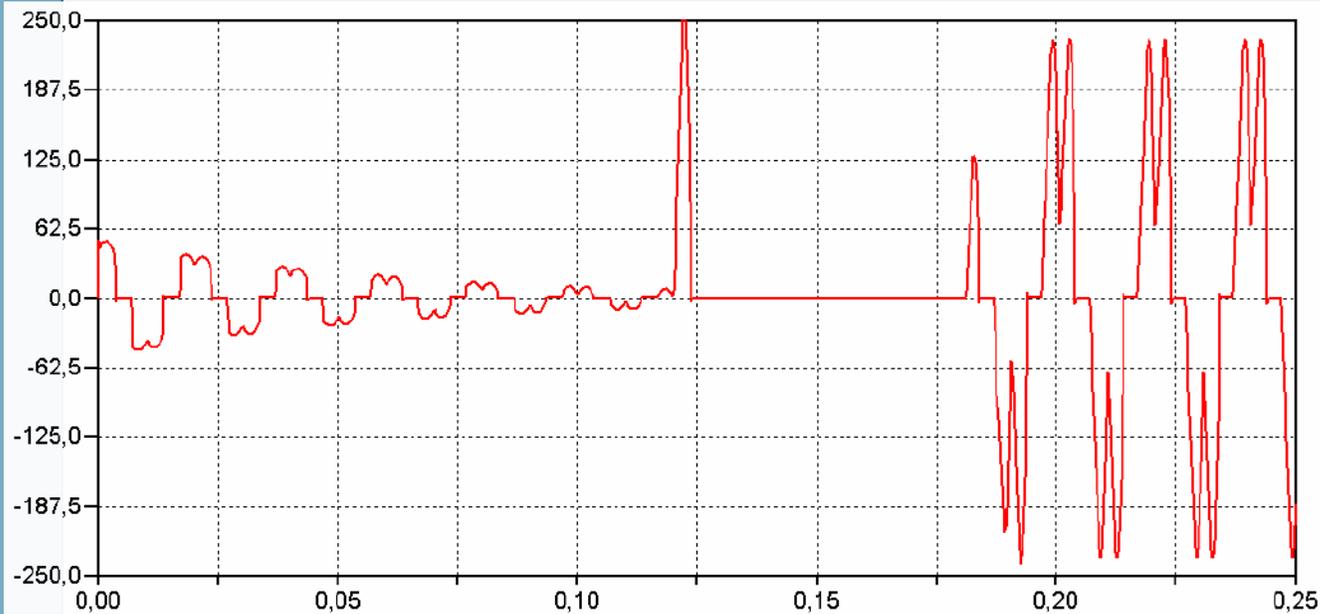
Ejemplo comercial:

<https://static.weg.net/medias/downloadcenter/h44/hc1/WEG-CFW500-catalog-50036260-es.pdf>



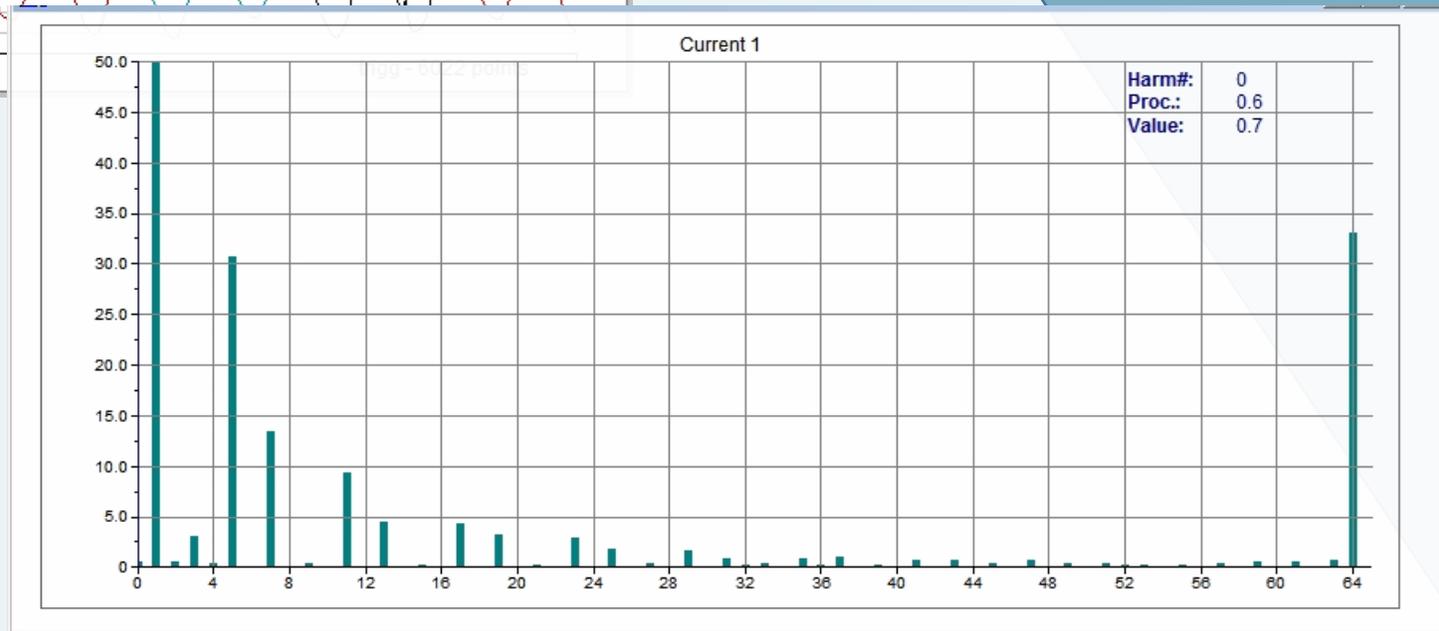
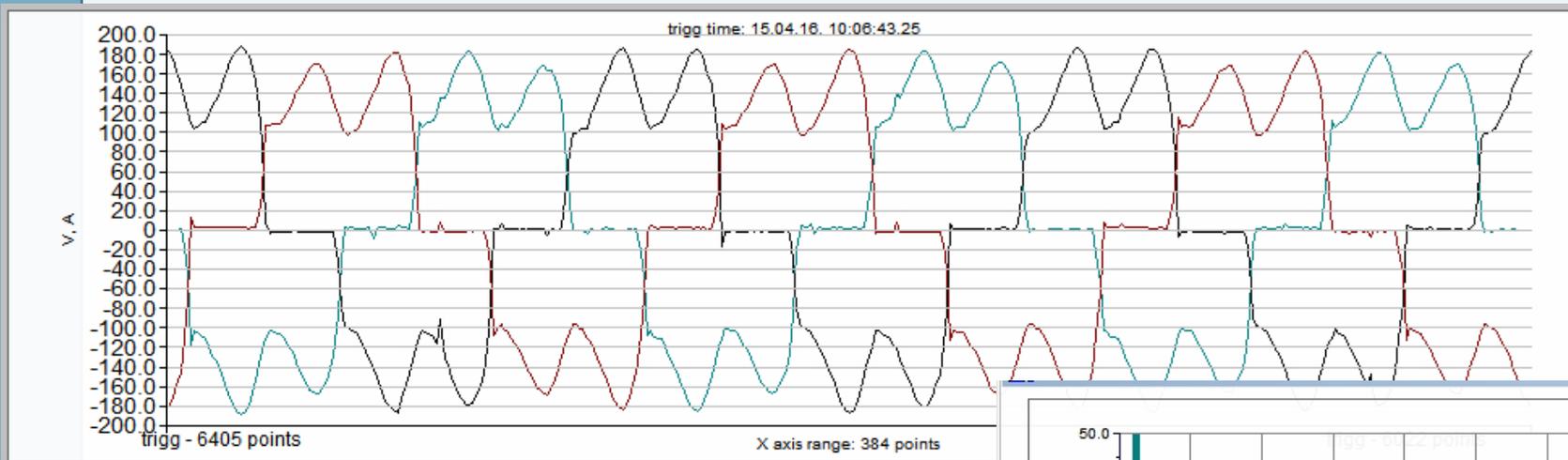
Ejemplo comercial:

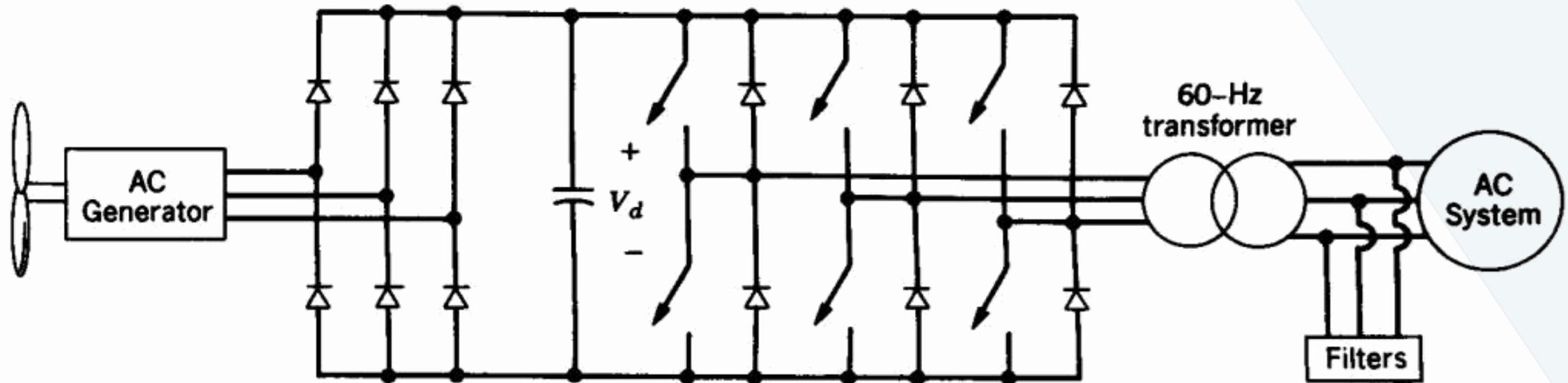
<https://www.equitecnica.com.ar/producto-detalle.php?id=50&codcat=10&codsub=80>



Funcionamiento de una máquina asincrónica en vacío instalada en la vecindad de un rectificador trifásico:

https://www.edutecne.utn.edu.ar/monografias/maquina_asincronica.pdf





Power Electronics 2nd. ed., Mohan (2003)

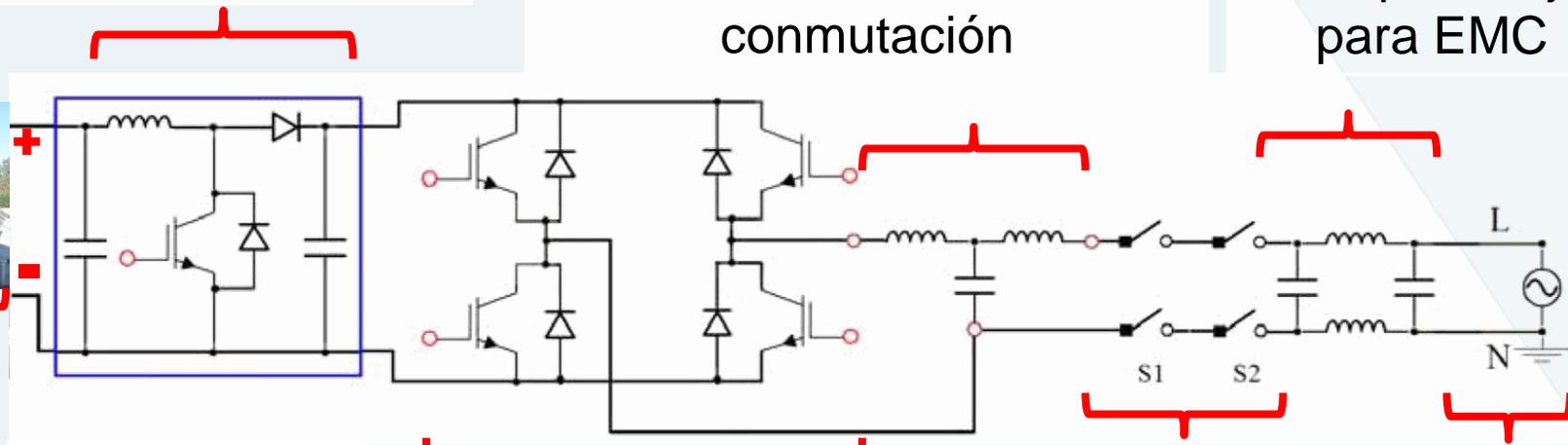
Adecuación del nivel de tensión DC

Filtro pasabajos sintonizado a la frecuencia de conmutación

Filtro pasabajos para EMC



Desde los paneles DC →

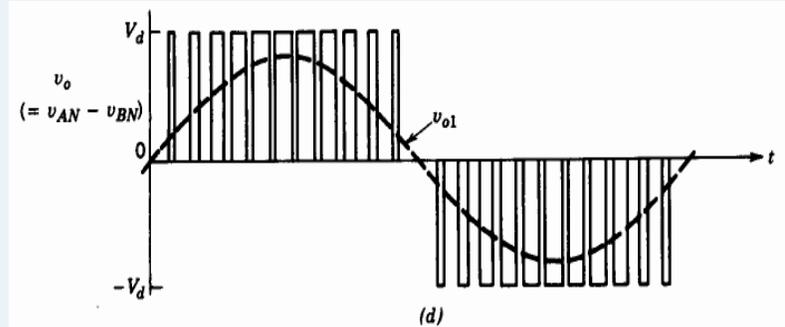


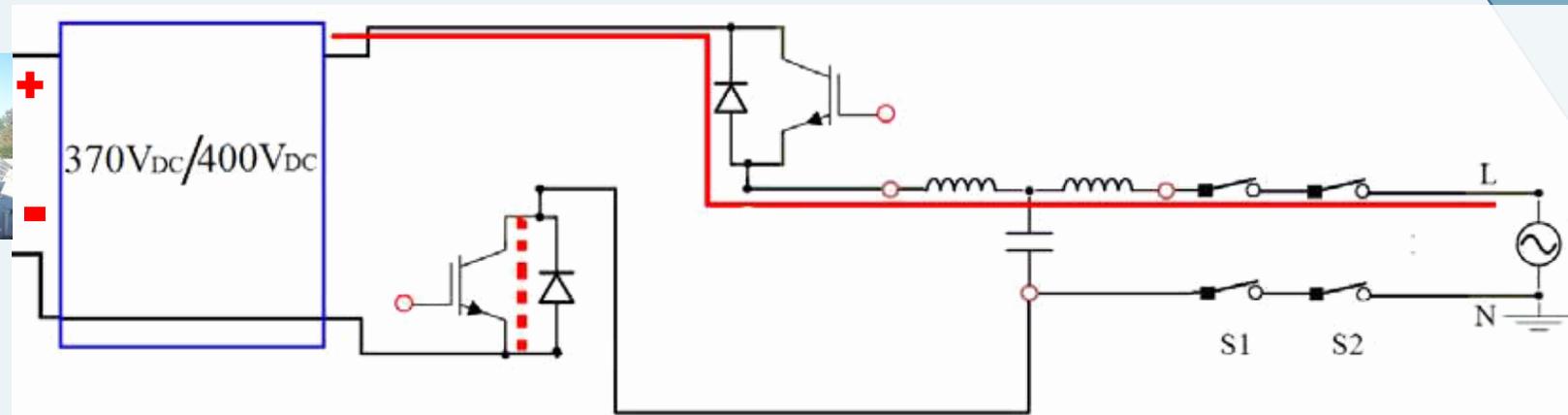
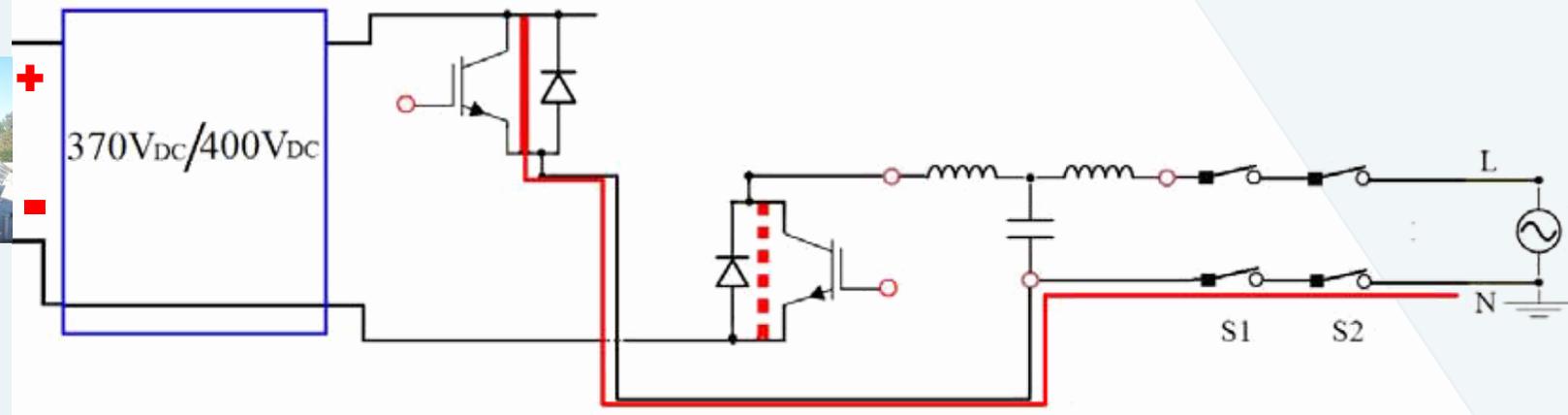
Cortesía IRESUD

Puente H tradicional (inversión DC → AC)

Doble relé para desconexión galvánica

Hacia la red → AC

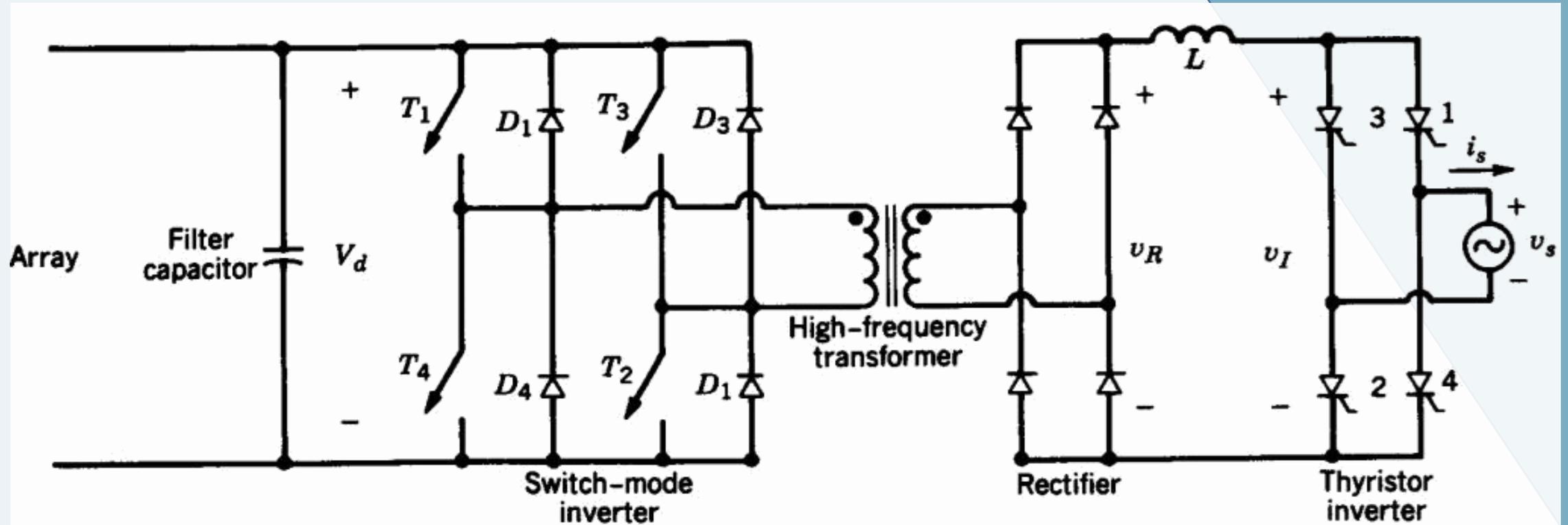




Conexión a red de inversores para paneles fotovoltaicos: condiciones generales

<https://www.youtube.com/watch?v=k3tOYGuUzag> (Aprox. 01:30-34:00)

Cortesía IRESUD

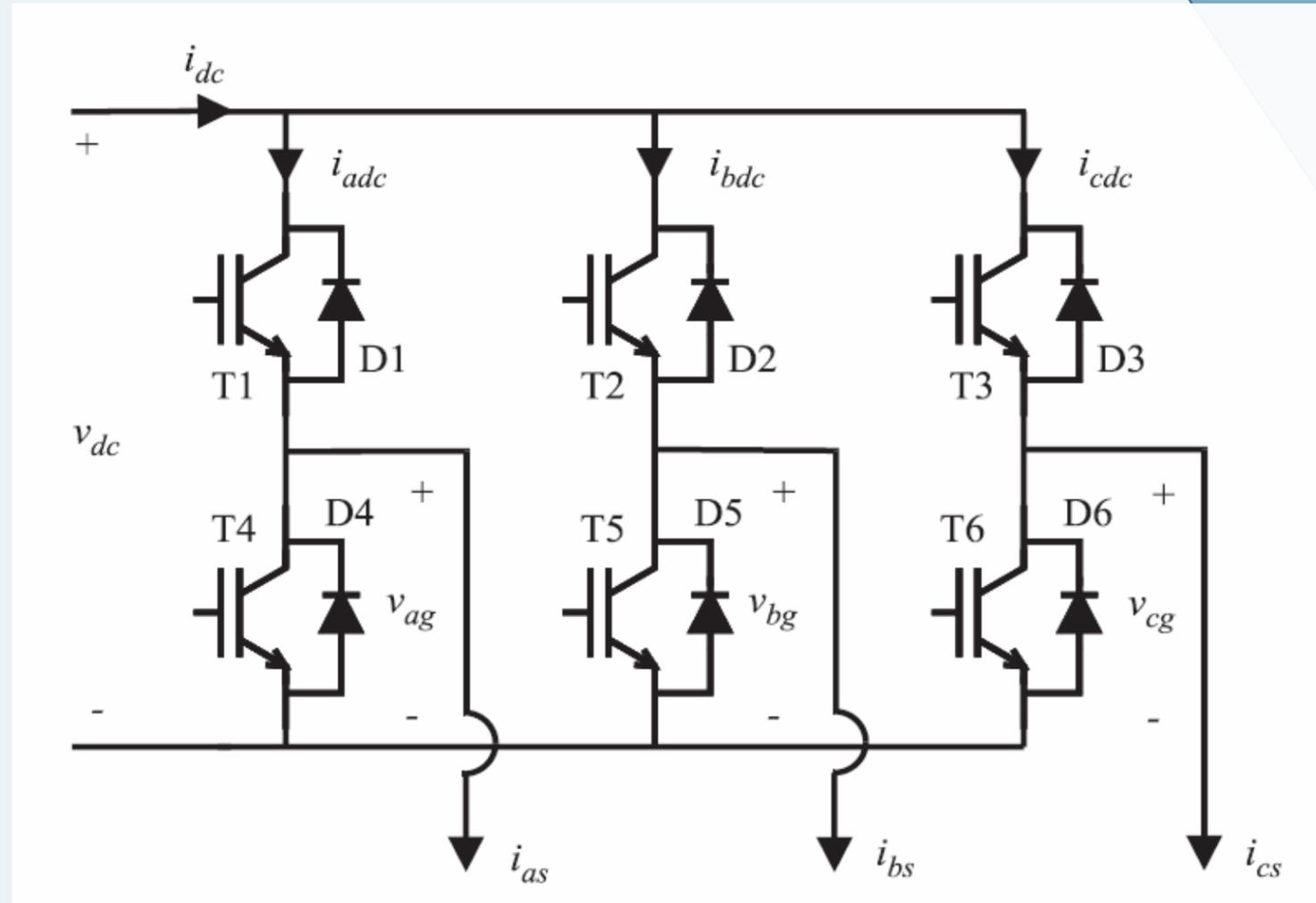


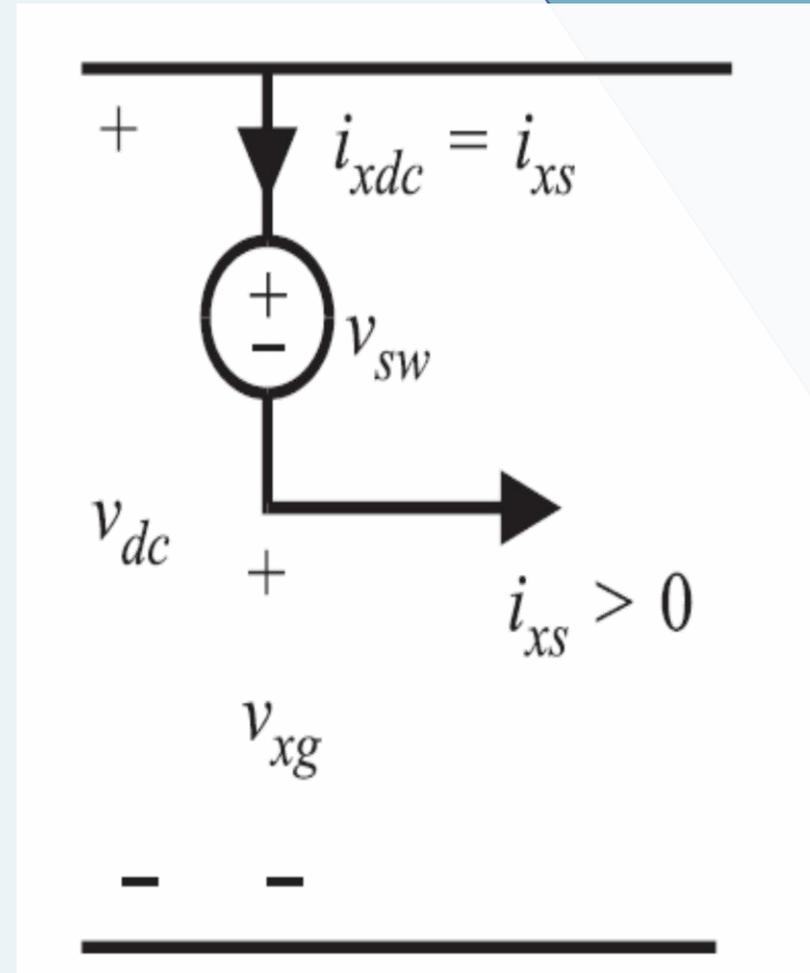
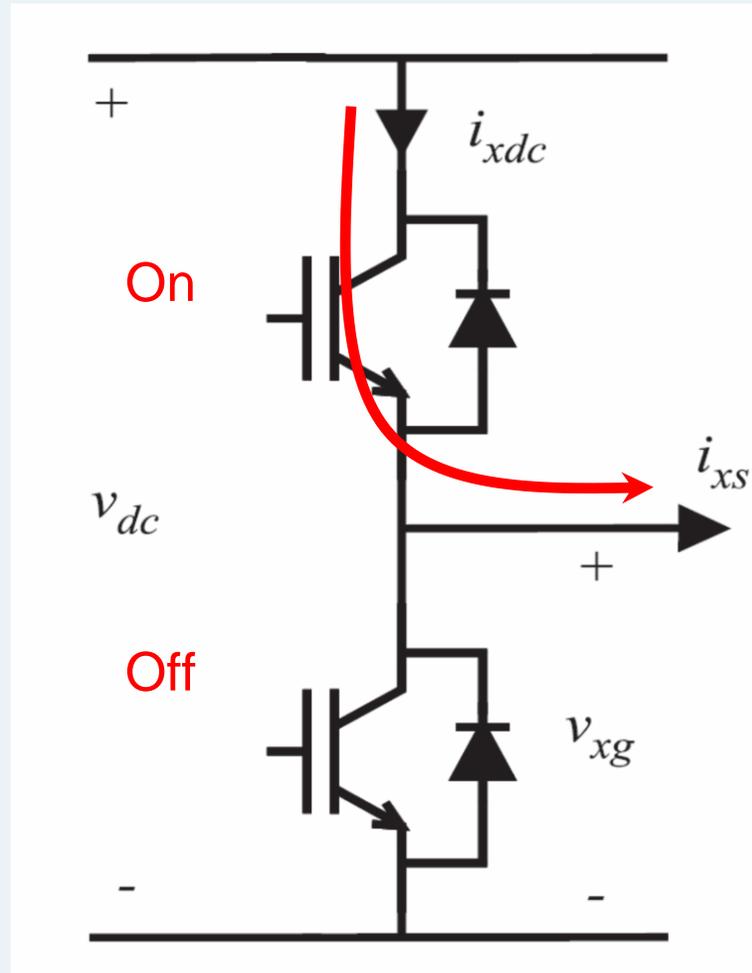
Power Electronics 2nd. ed., Mohan (2003)

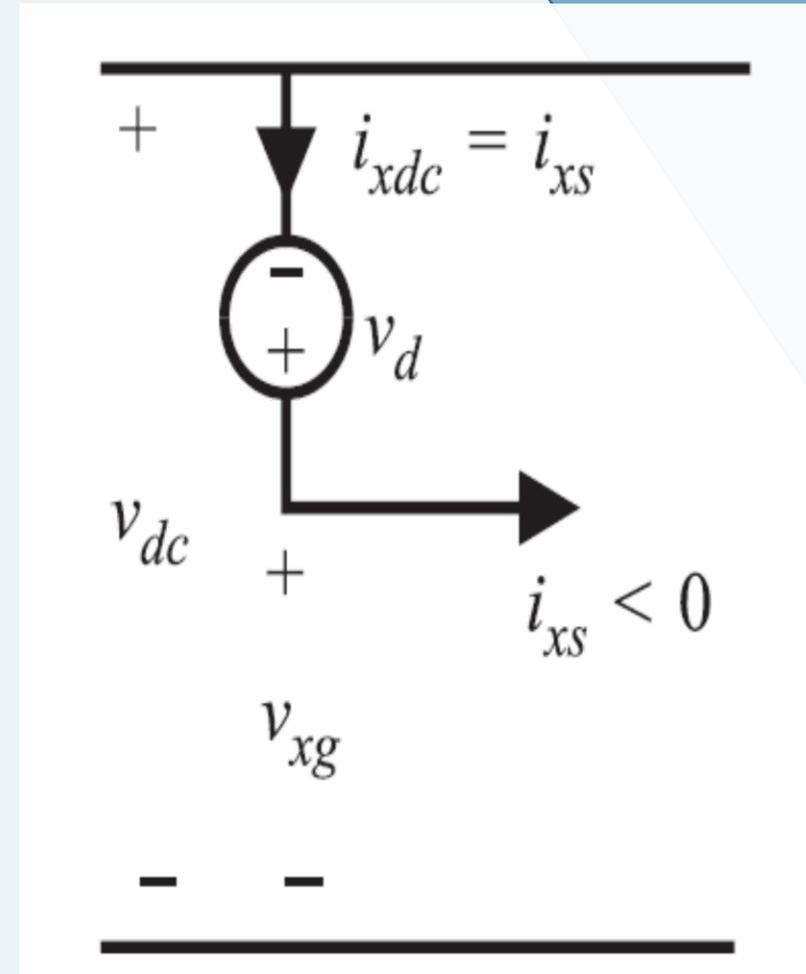
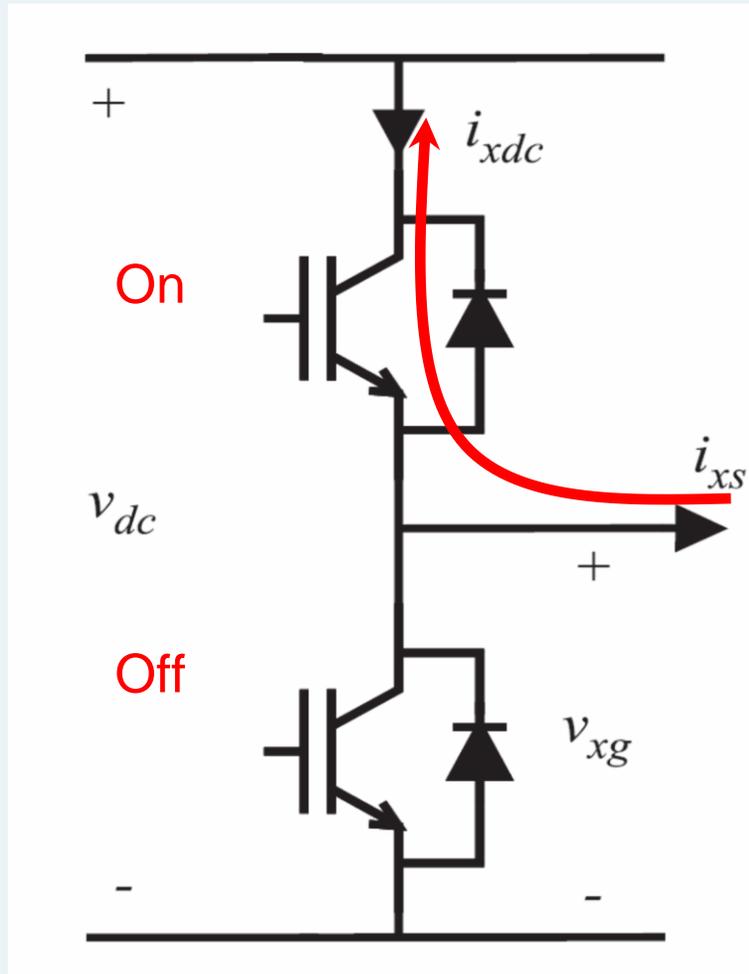
2024

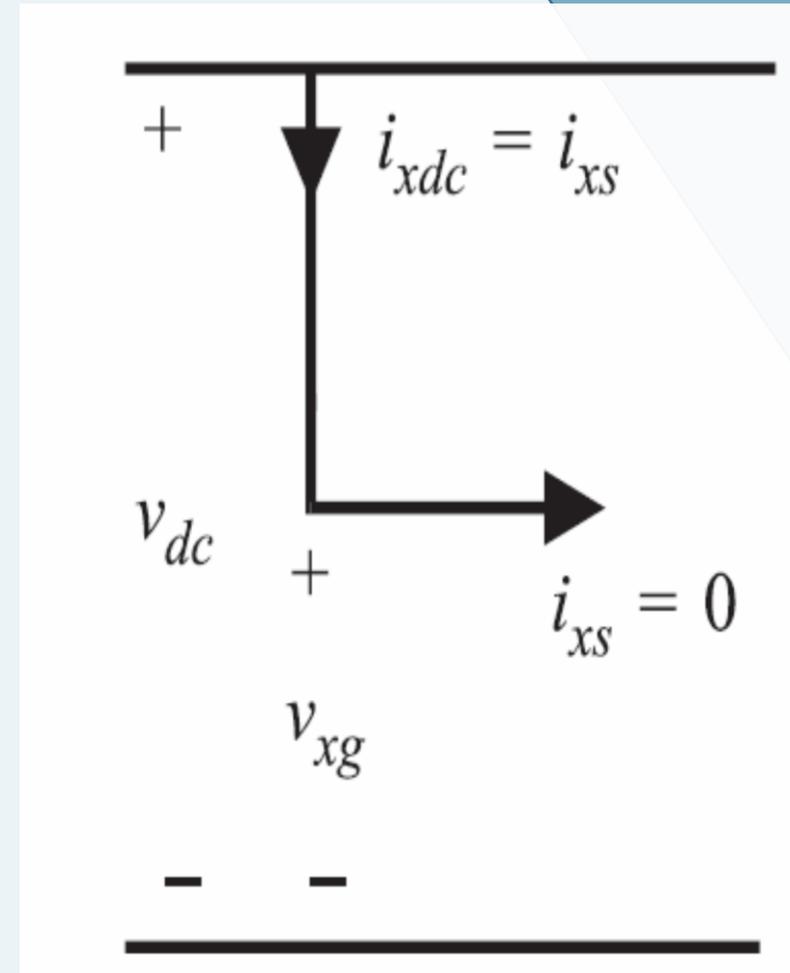
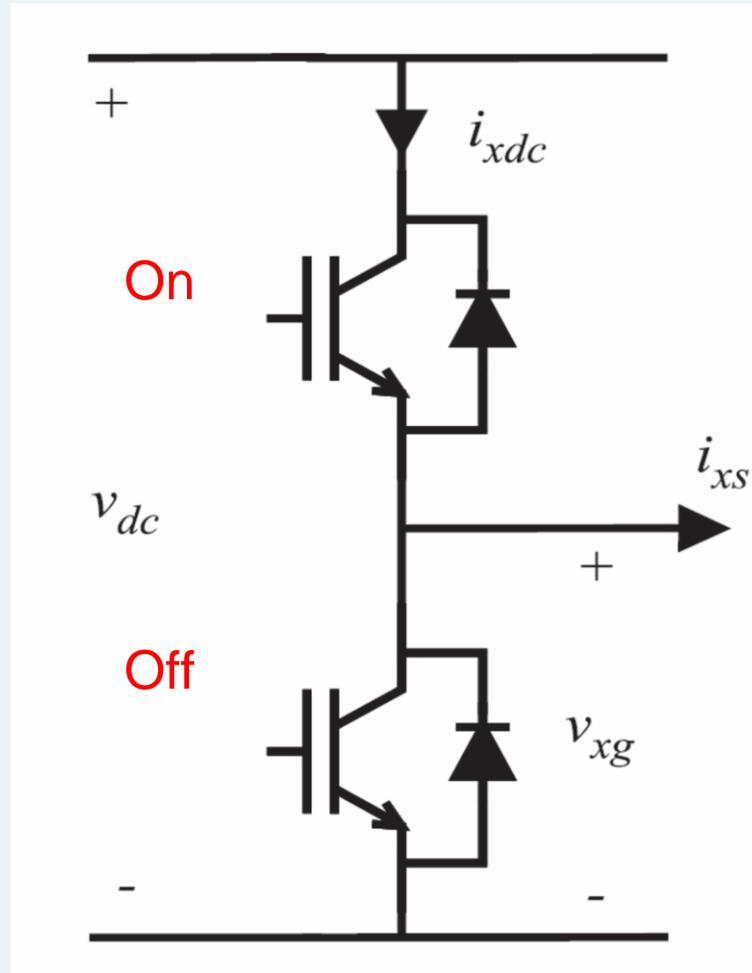
Máquinas Eléctricas (4.º “X”)
Máquinas e Instalaciones Eléctricas (4.º “R”)

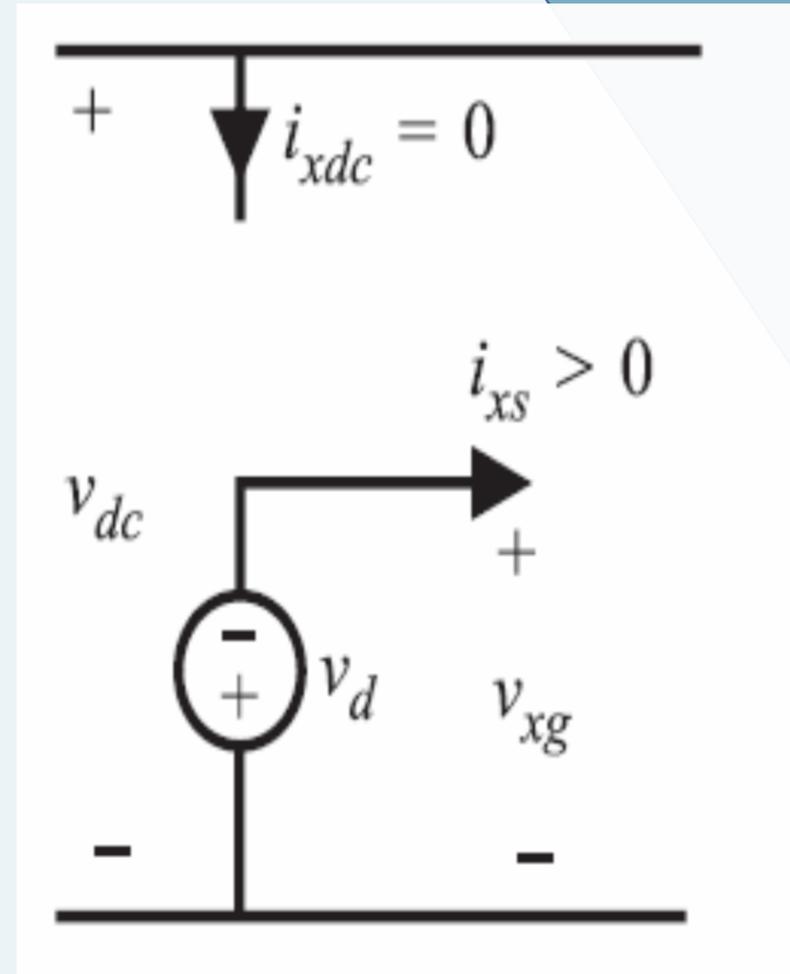
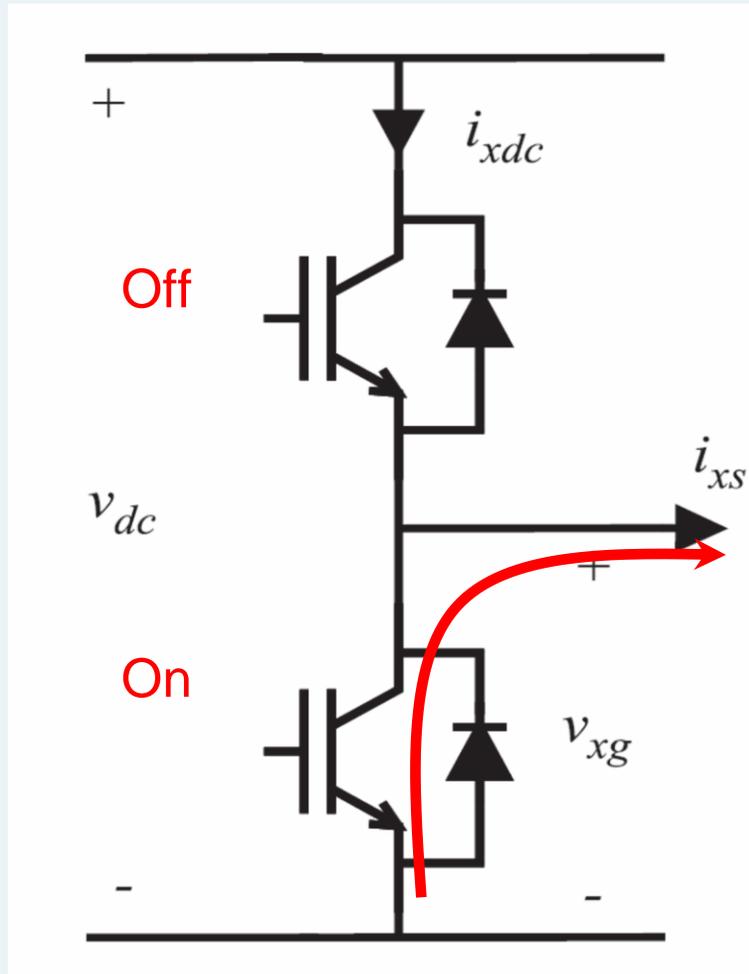
Convertidores trifásicos: funcionamiento

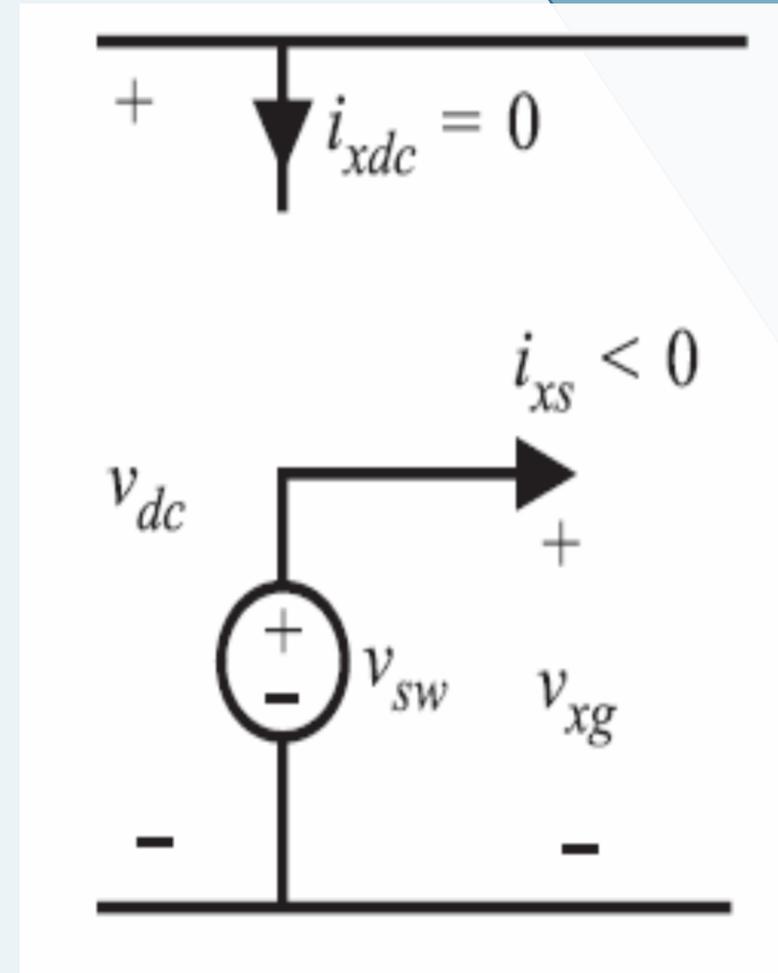
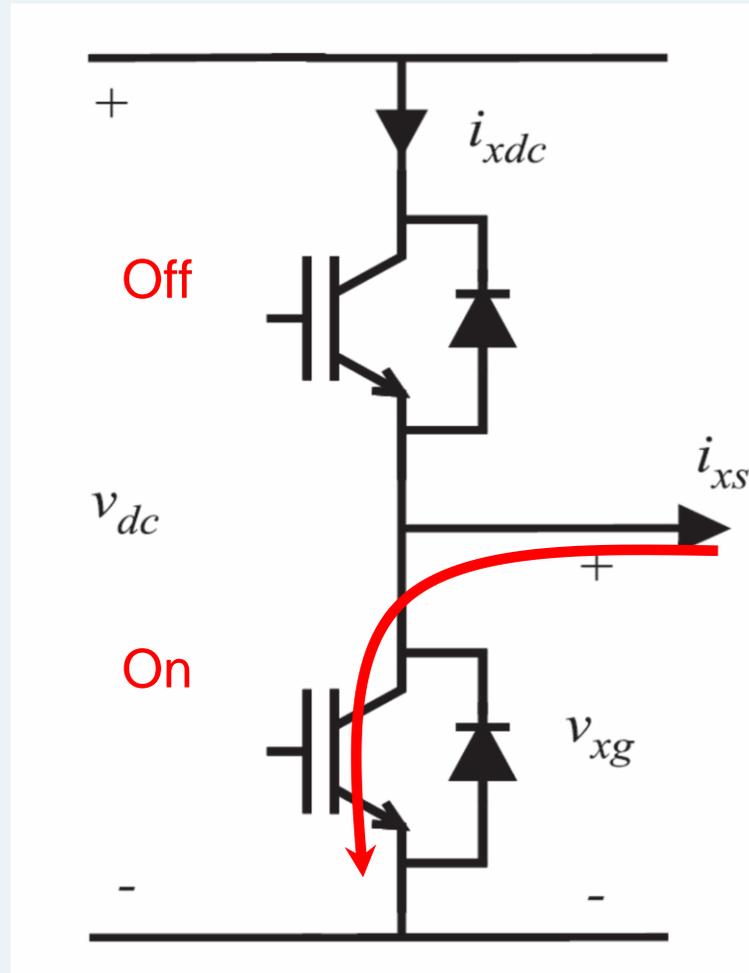


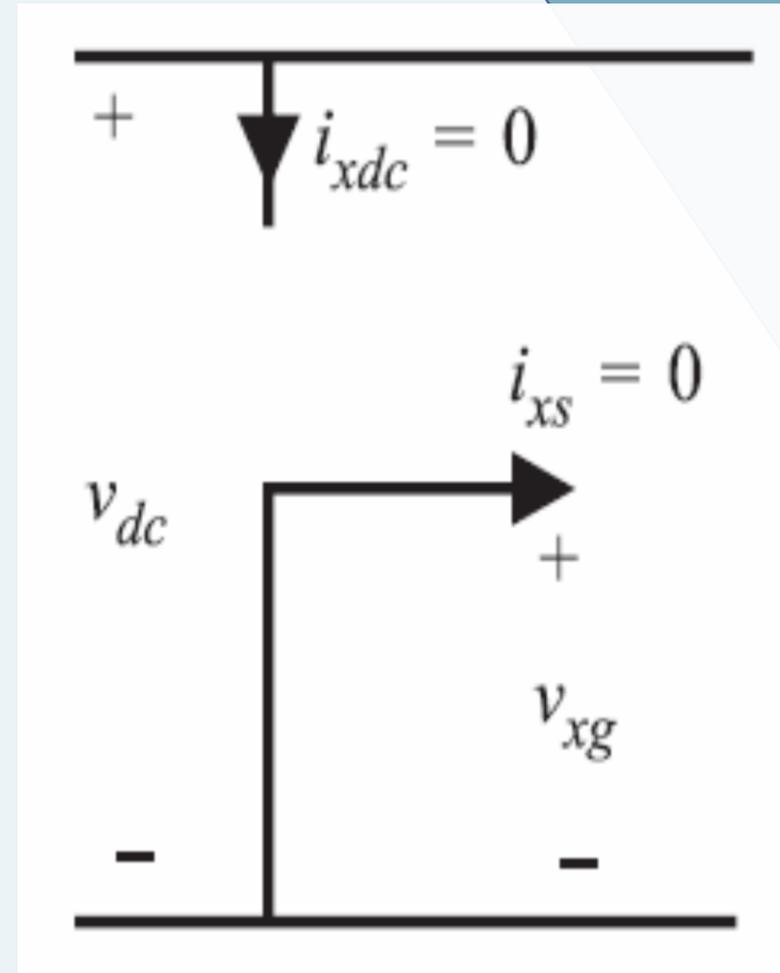
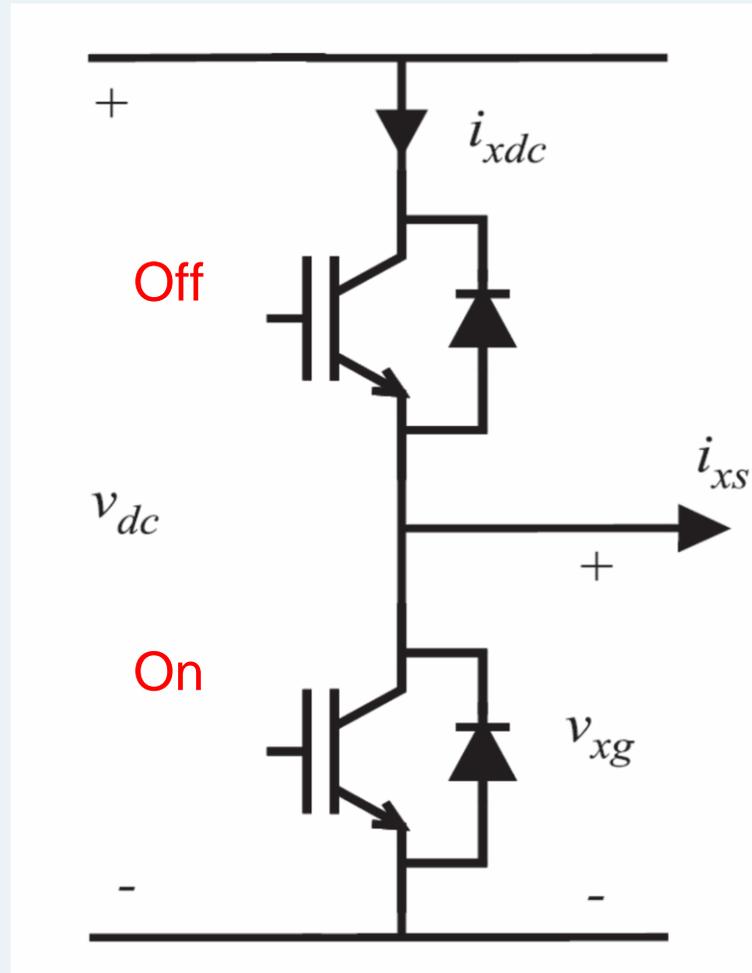


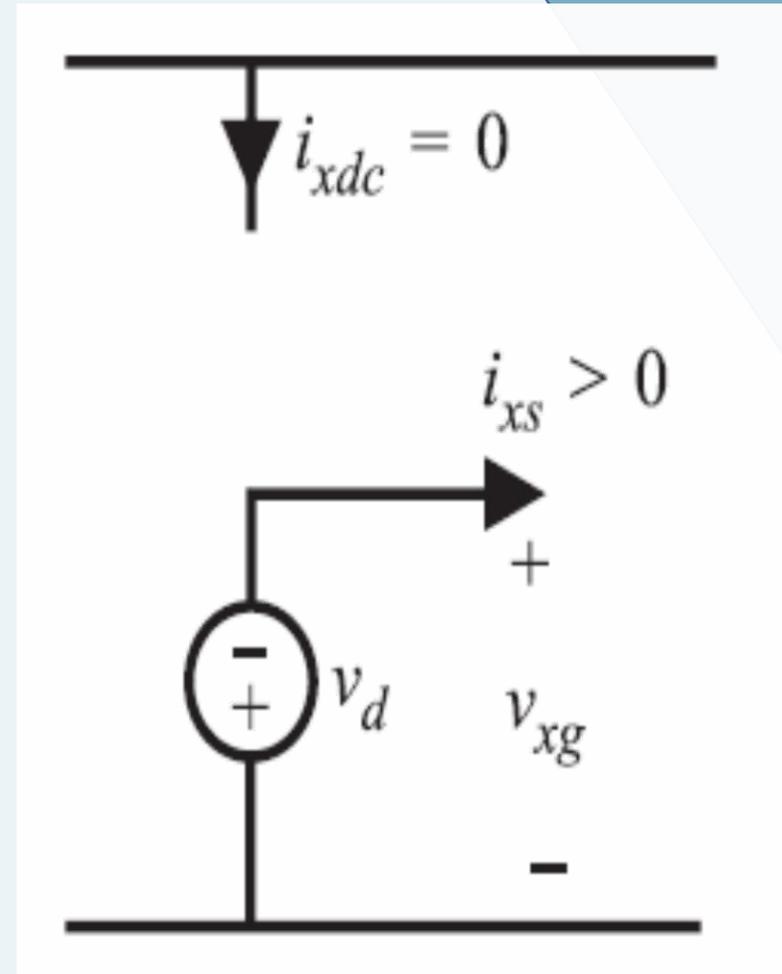
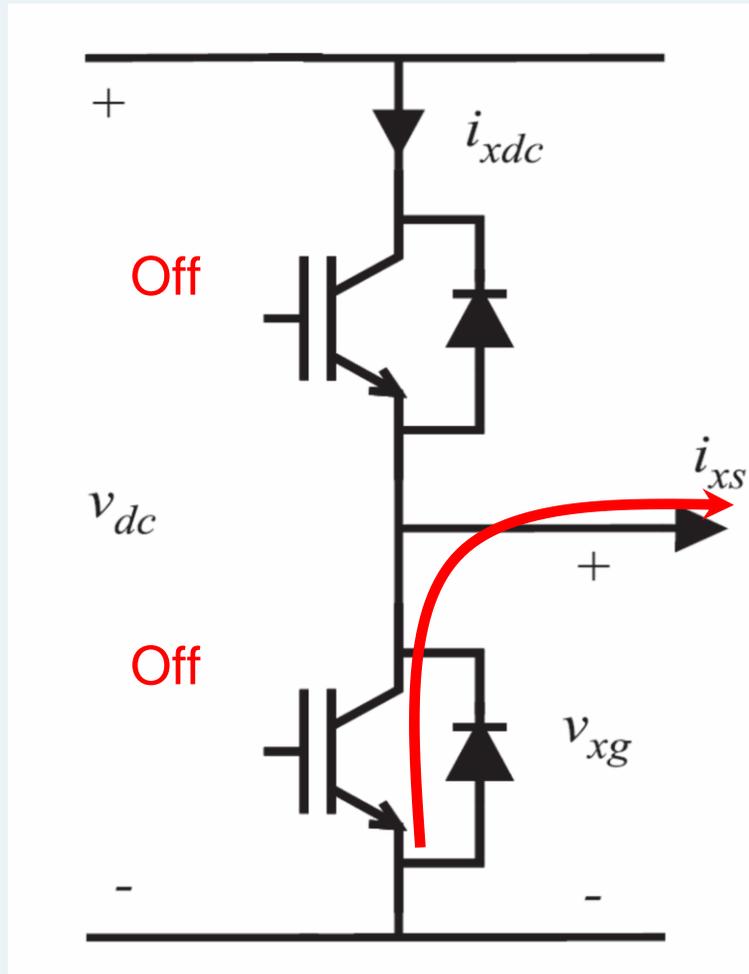


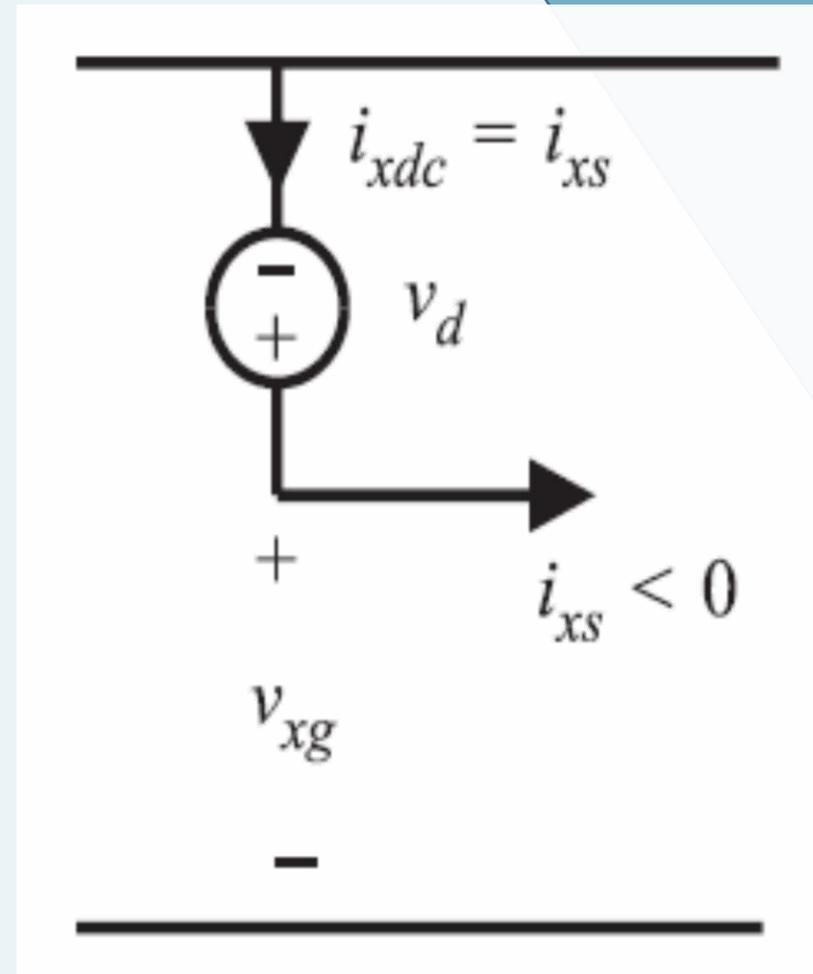
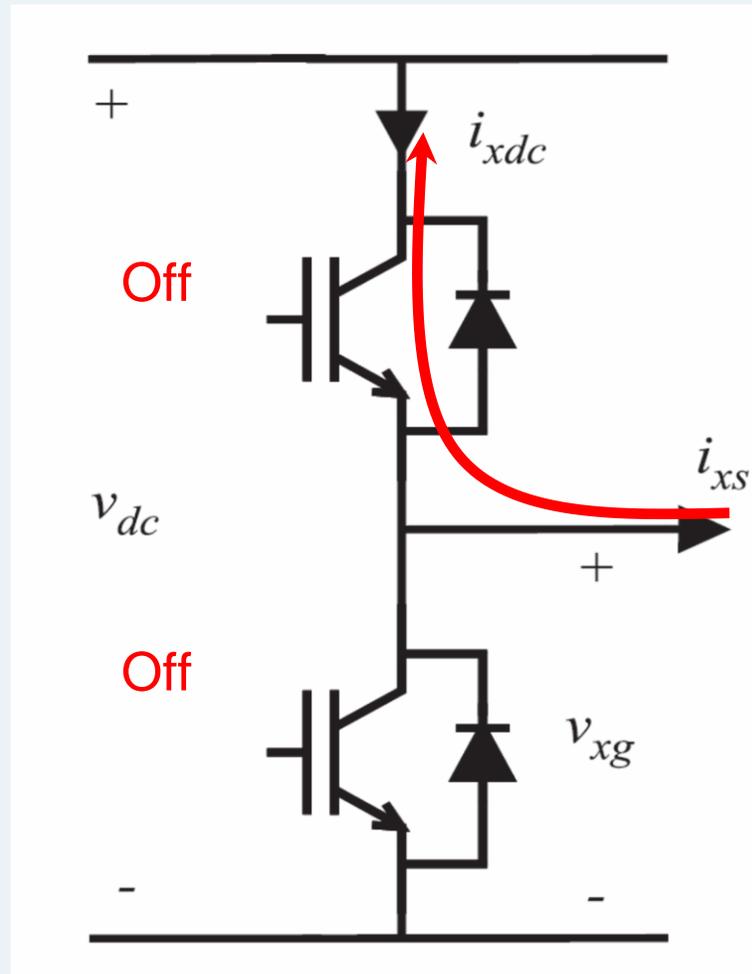












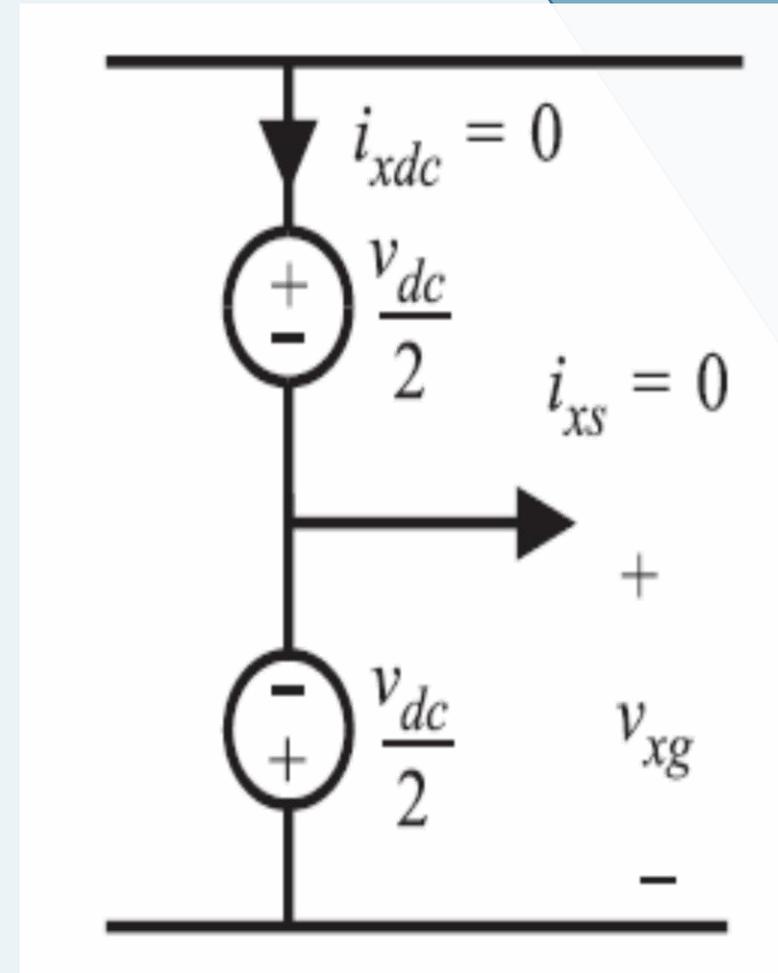
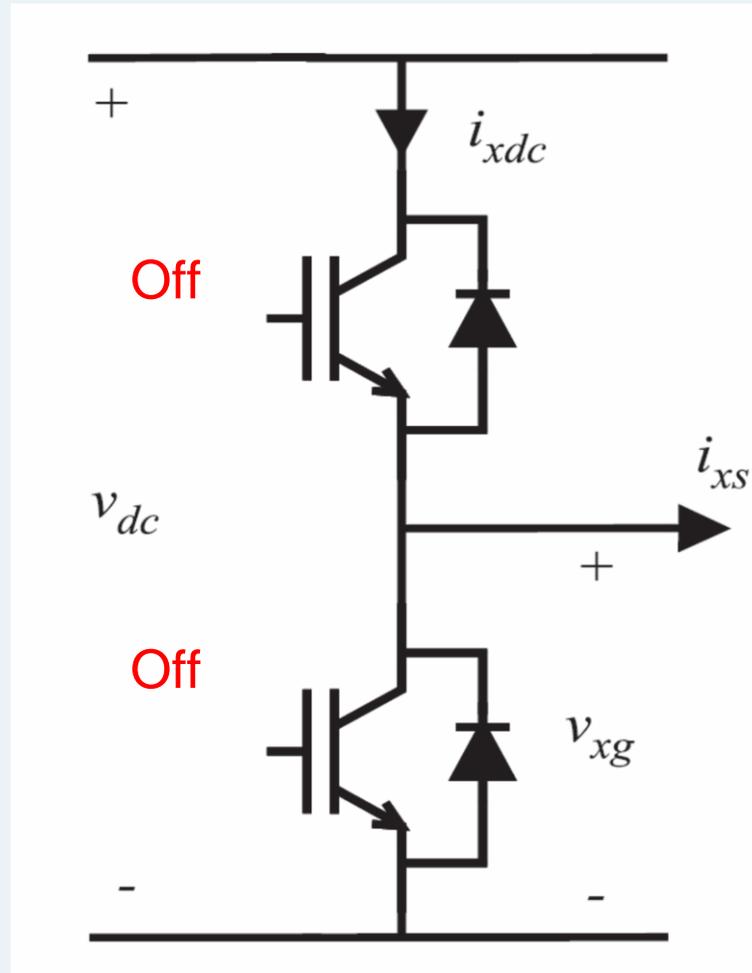
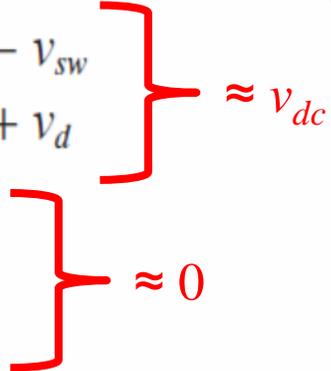
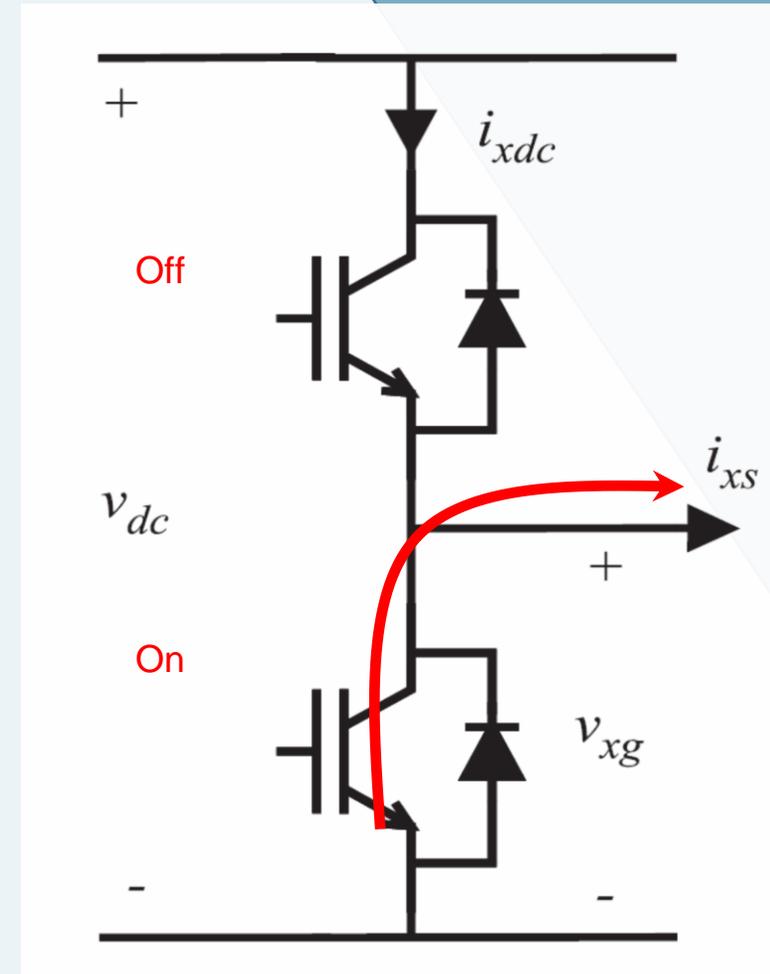
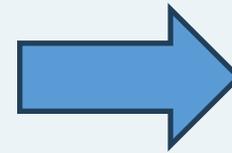
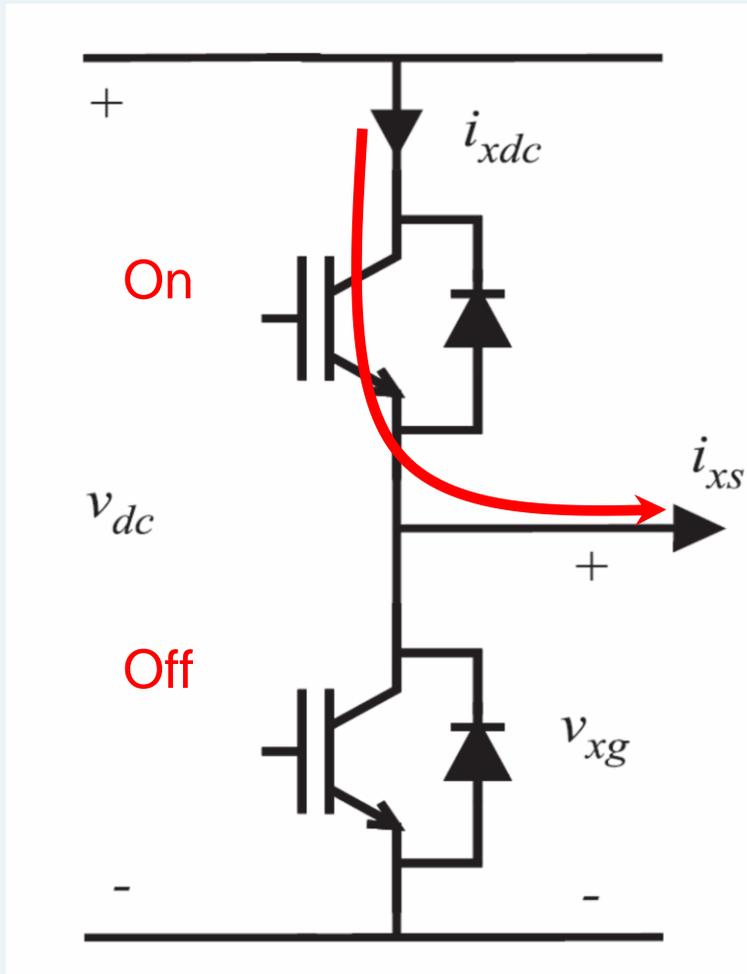
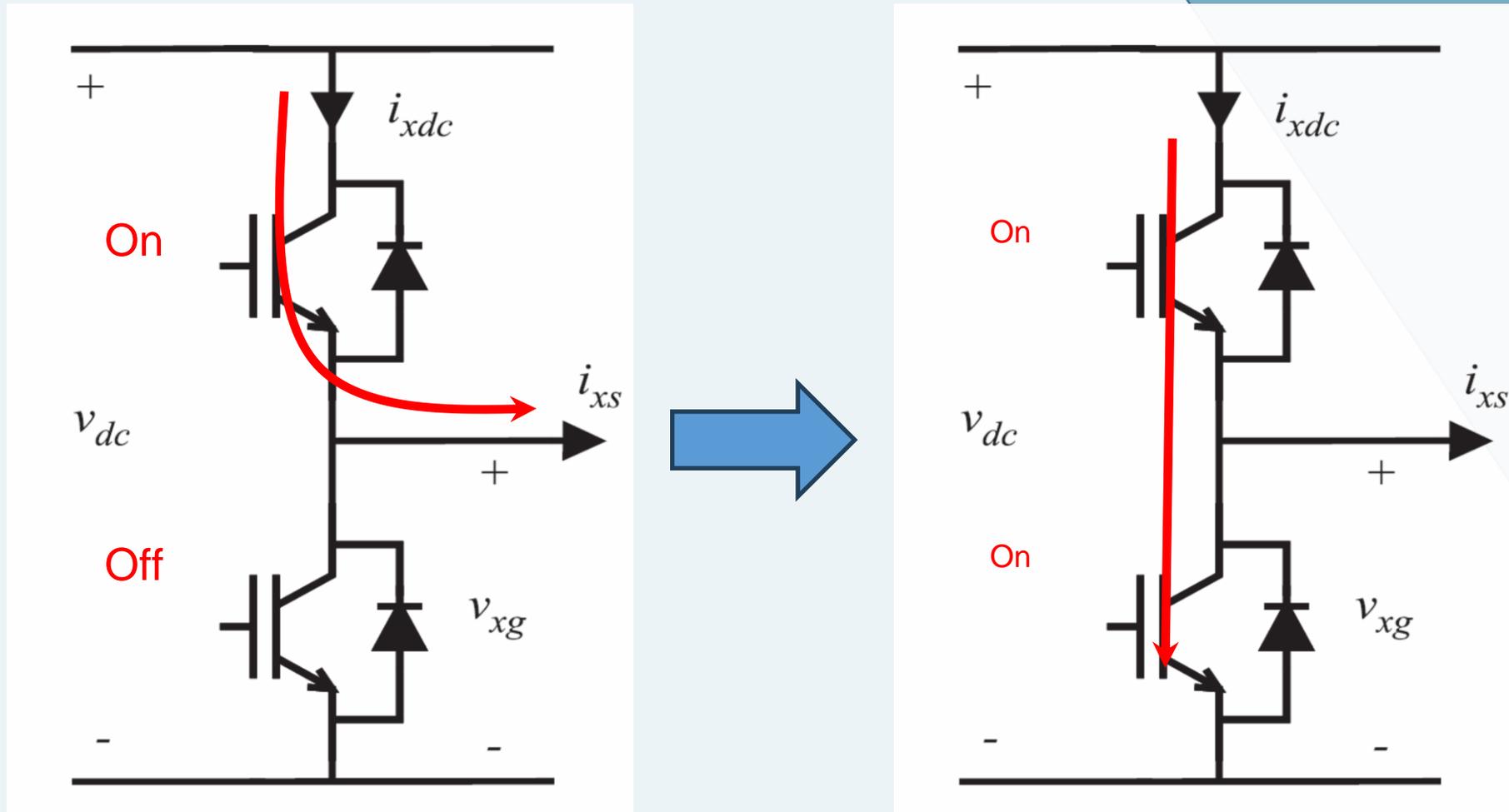


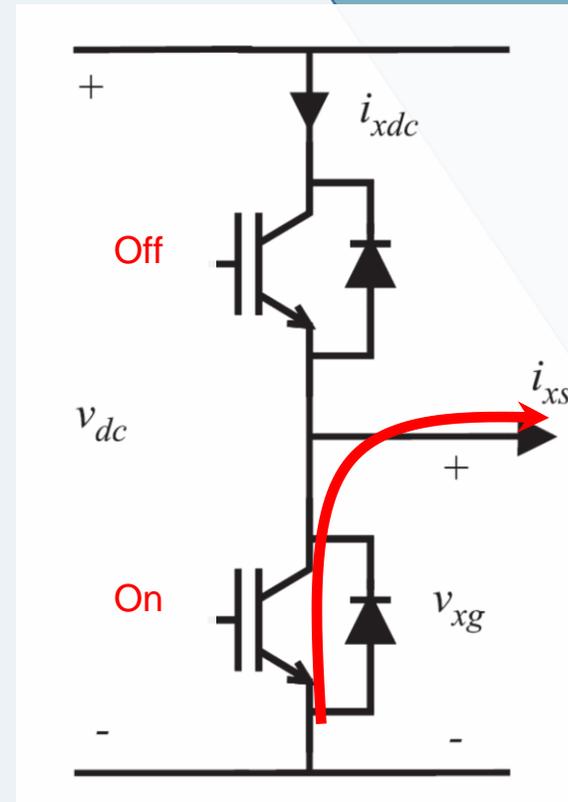
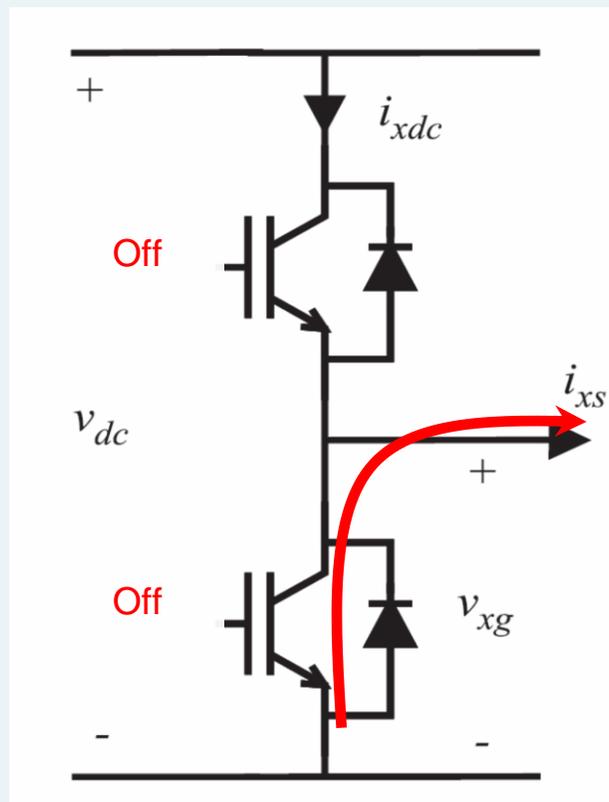
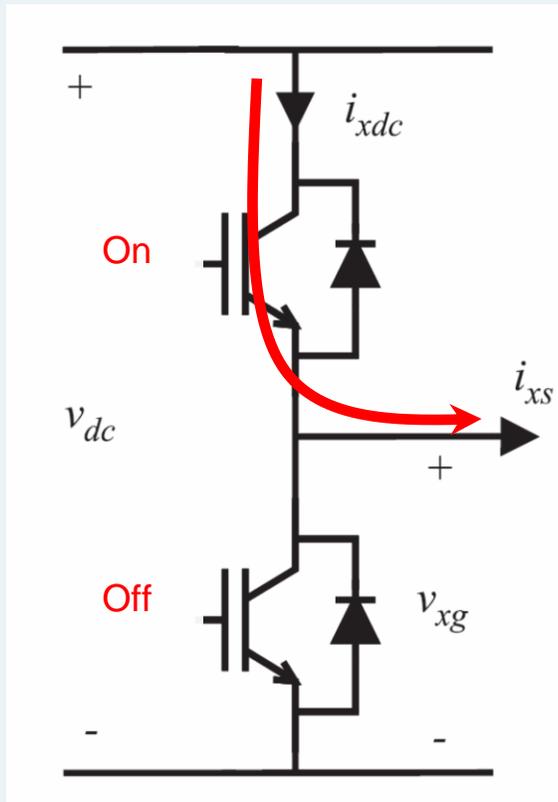
TABLE 12.2-1. Converter Voltages and Currents

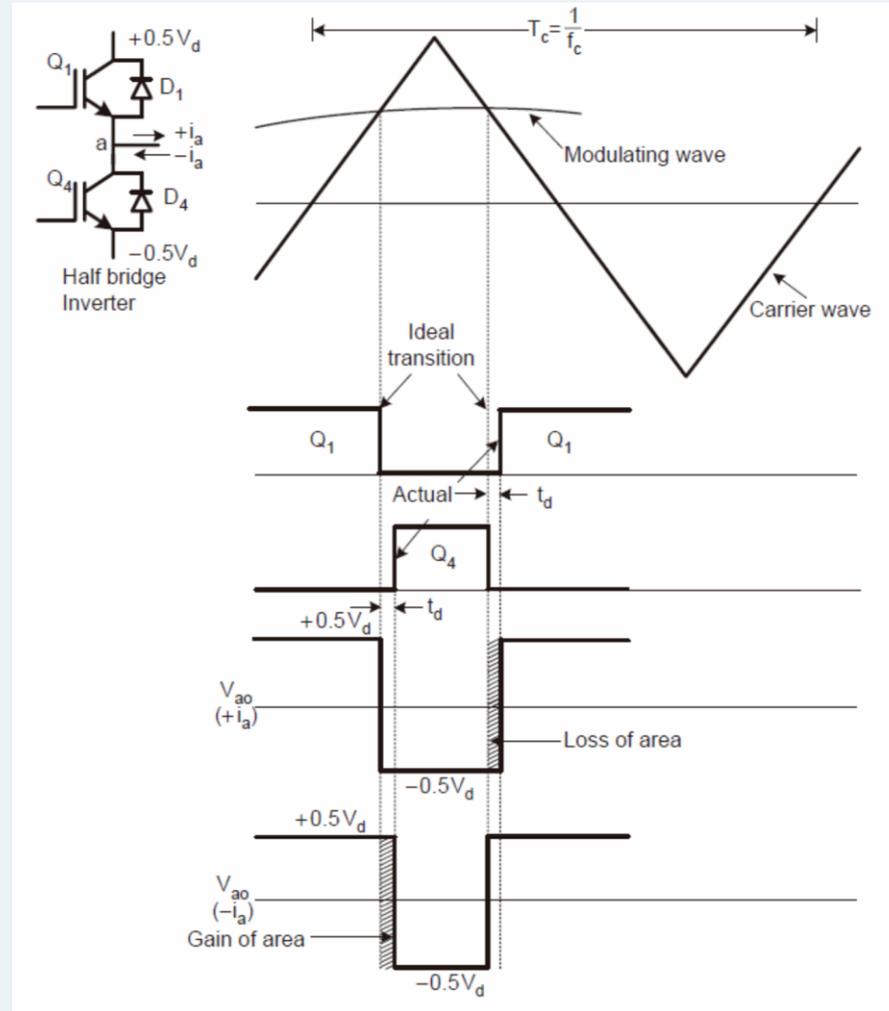
Switch On	Current Polarity	v_{xg}	i_{xdc}
Upper	Positive	$v_{dc} - v_{sw}$	i_{xs}
	Negative	$v_{dc} + v_d$	i_{xs}
	Zero	v_{dc}	i_{xs}
Lower	Positive	$-v_d$	0
	Negative	v_{sw}	0
	Zero	0	0
Neither	Positive	$-v_d$	0
	Negative	$v_{dc} + v_d$	i_{xs}
	Zero	$v_{dc}/2$	0







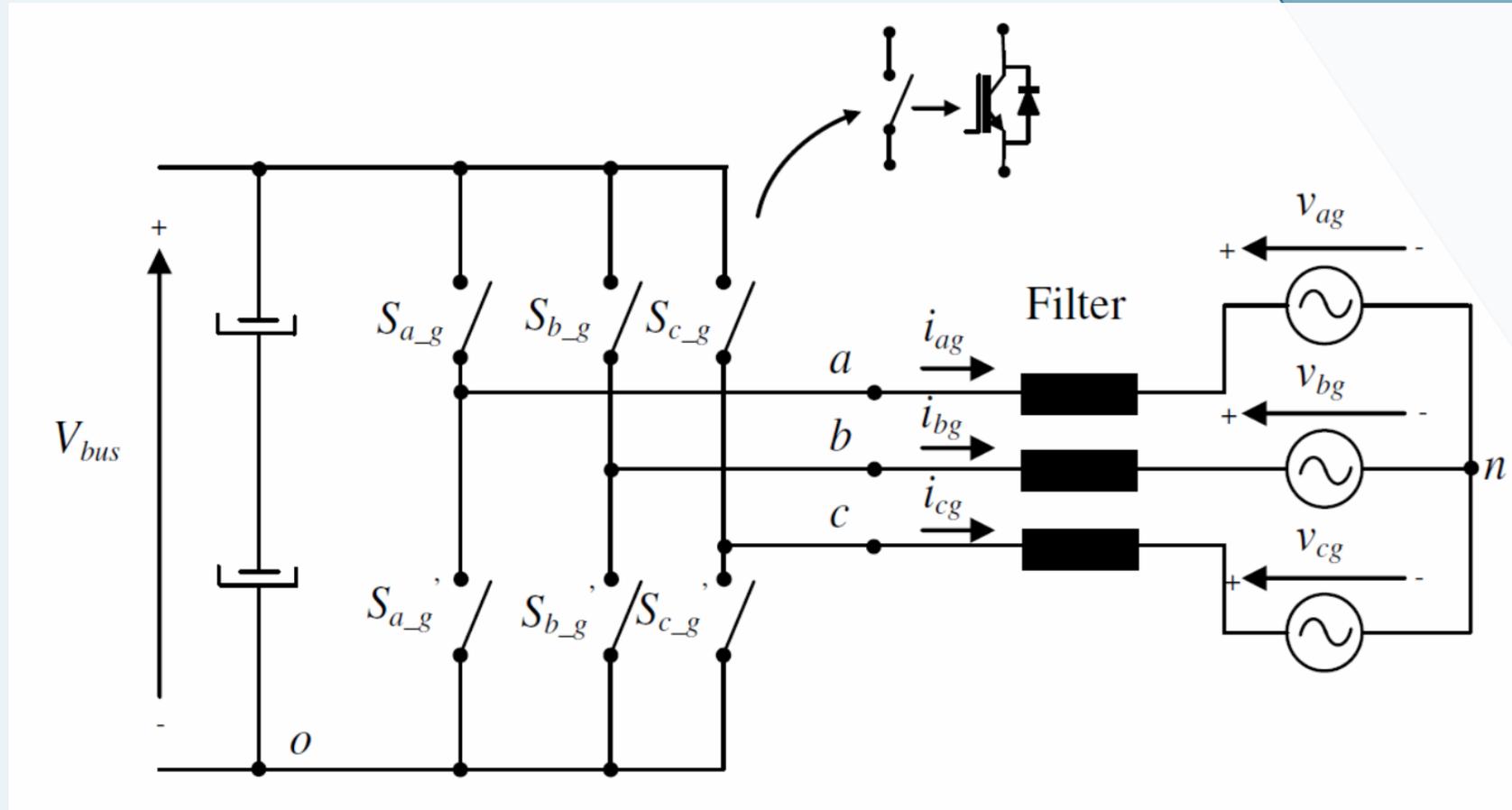


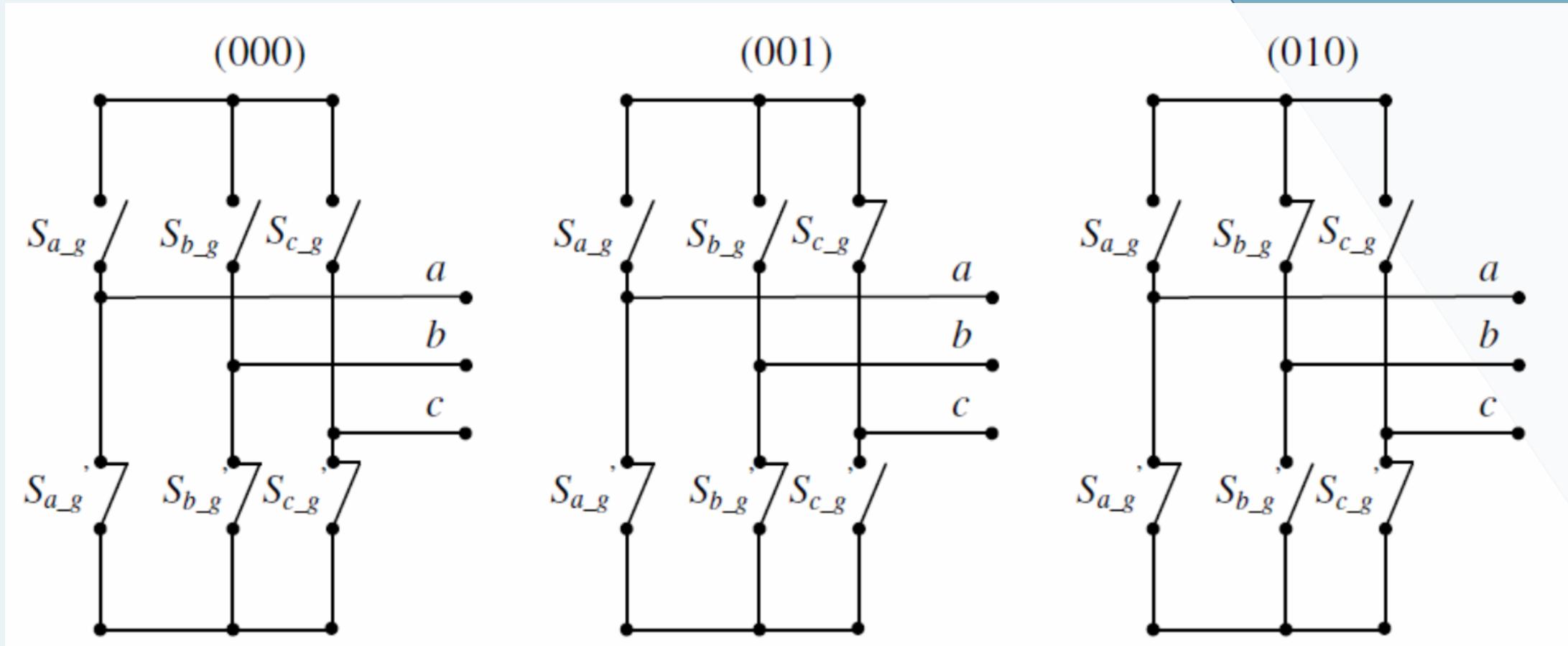


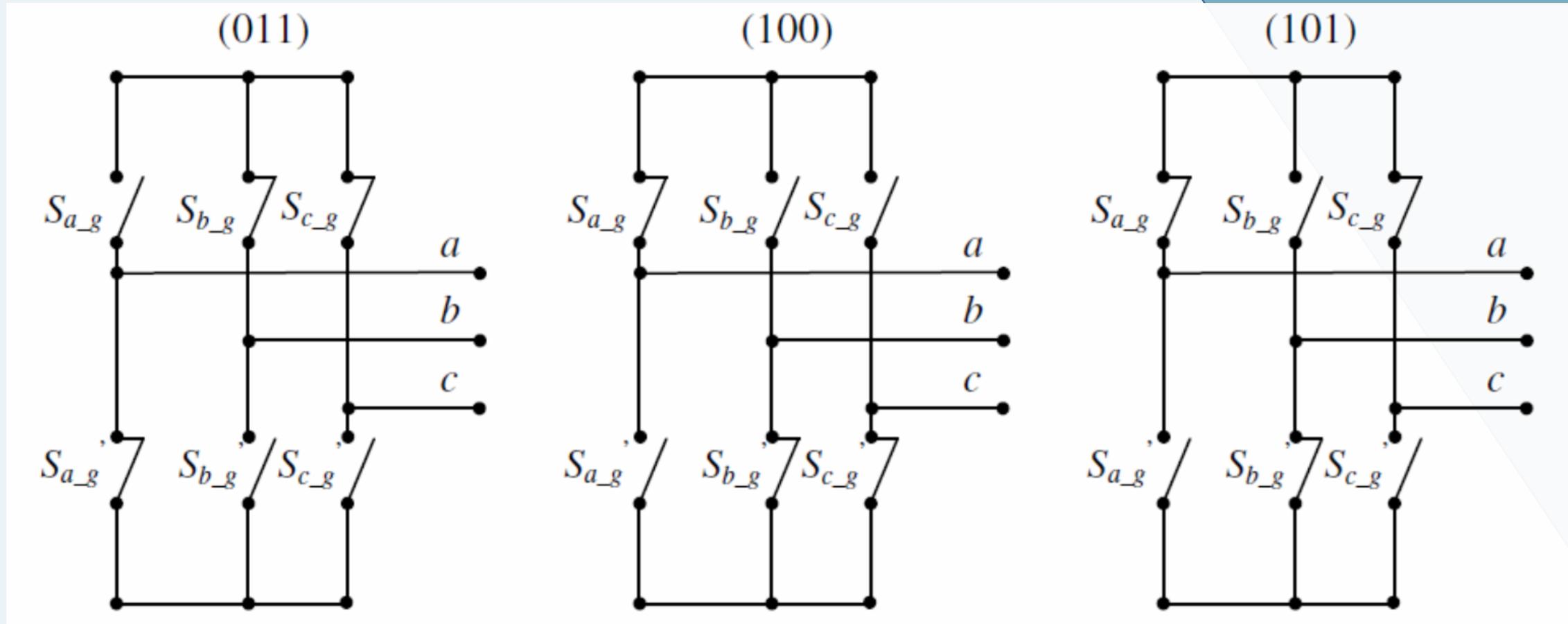
2024

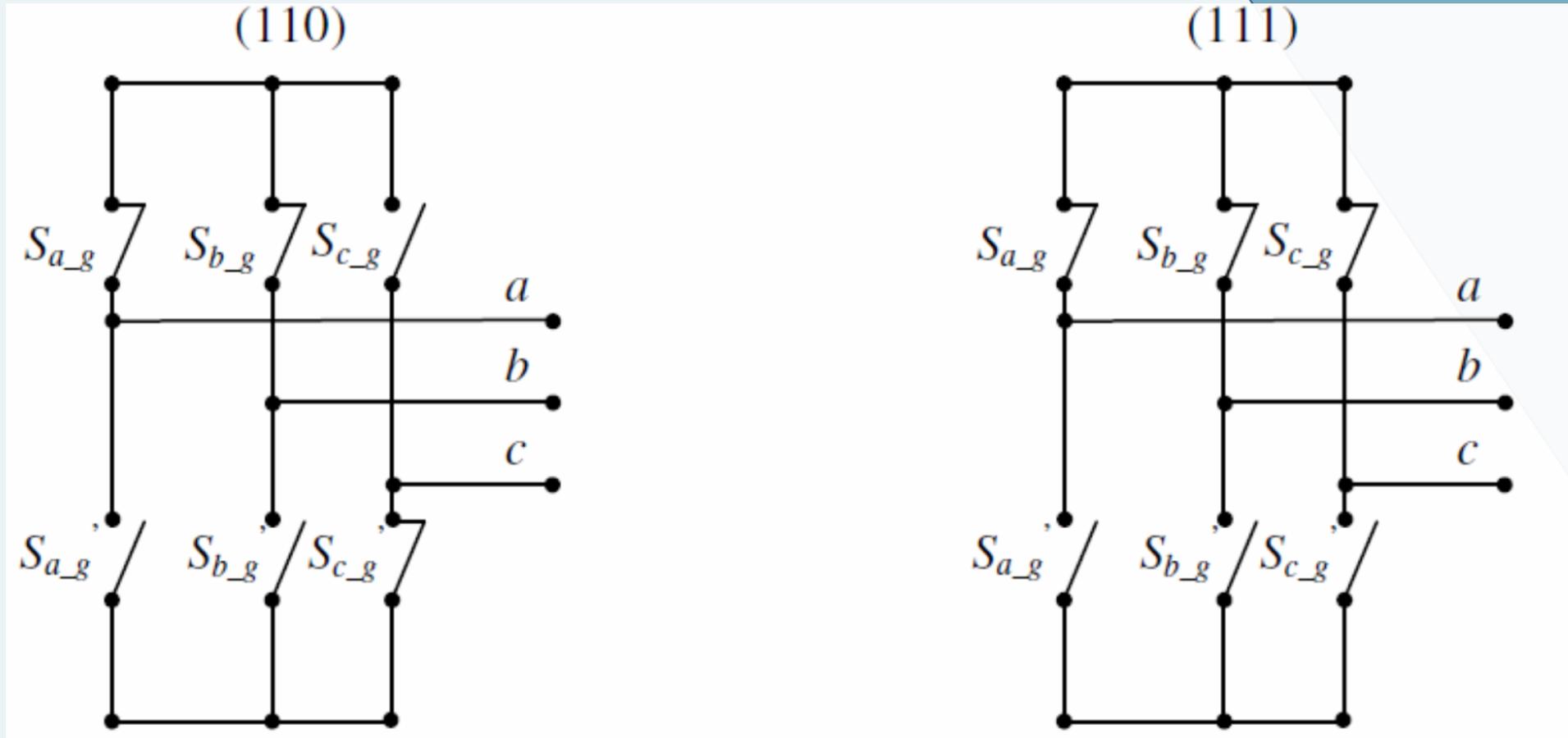
Máquinas Eléctricas (4.º “X”)
Máquinas e Instalaciones Eléctricas (4.º “R”)

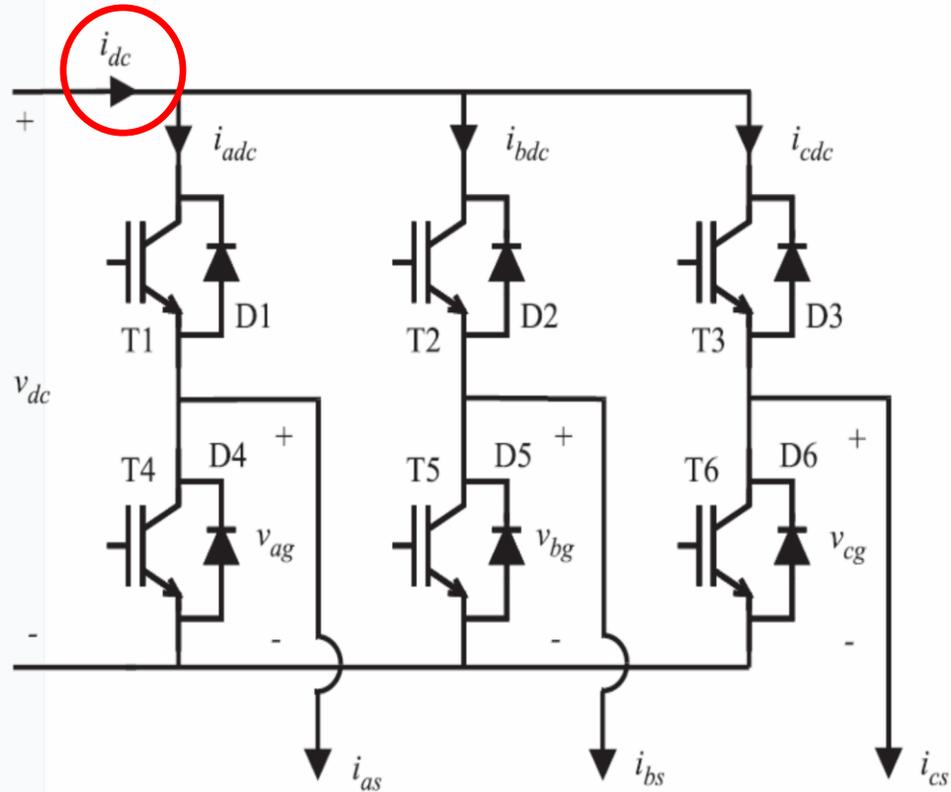
Convertidores trifásicos: funcionamiento en 6 pulsos











$$i_{dc} = i_{adc} + i_{bdc} + i_{cdc}$$

$$v_{abs} = v_{ag} - v_{bg}$$

$$v_{bcs} = v_{bg} - v_{cg}$$

$$v_{cas} = v_{cg} - v_{ag}$$



$$v_{ag} = v_{as} + v_{ng}$$

$$v_{bg} = v_{bs} + v_{ng}$$

$$v_{cg} = v_{cs} + v_{ng}$$

$$v_{ng} = \frac{1}{3}(v_{ag} + v_{bg} + v_{cg}) - \frac{1}{3}(v_{as} + v_{bs} + v_{cs})$$

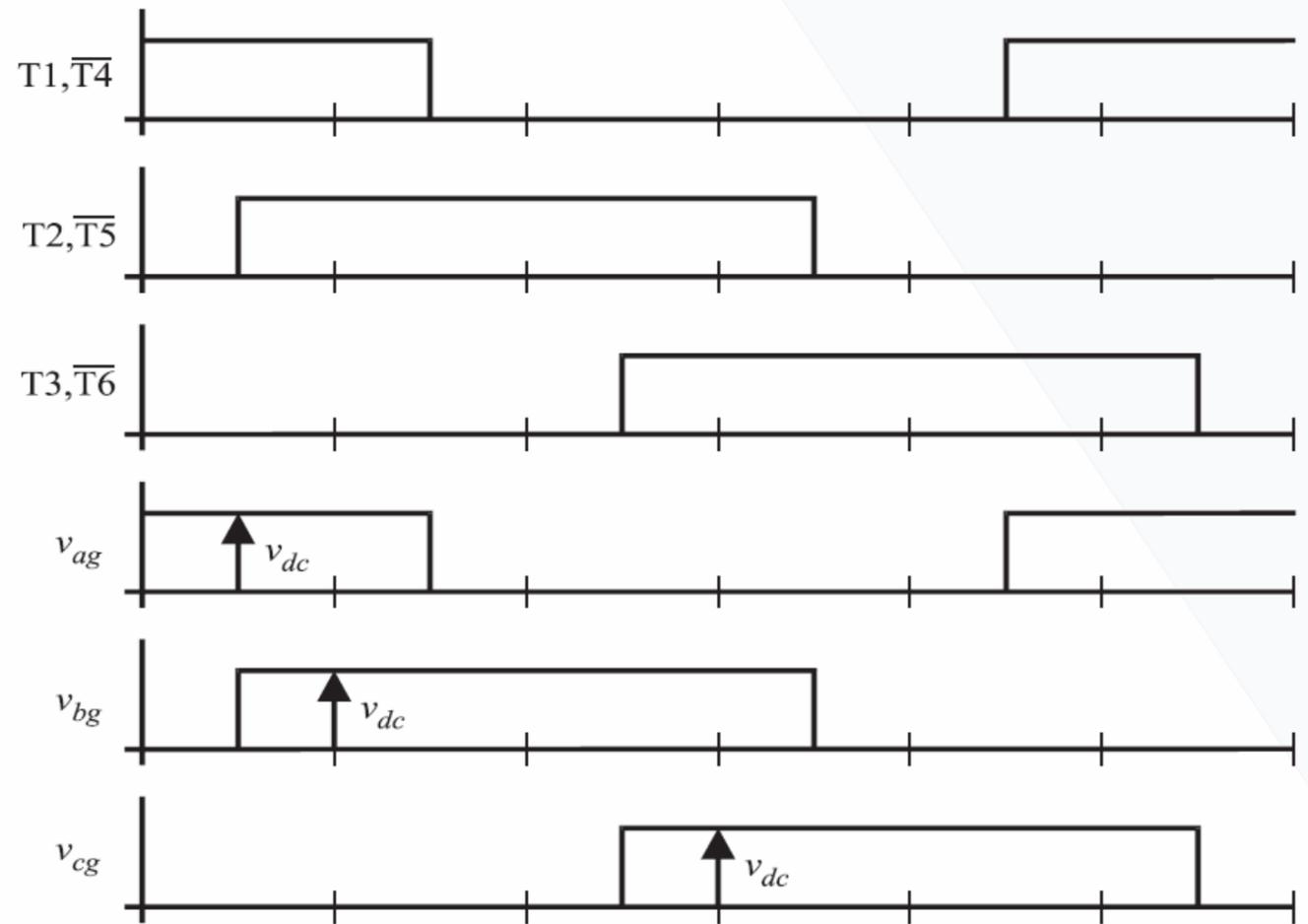
$$v_{ng} = \frac{1}{3}(v_{ag} + v_{bg} + v_{cg}) - v_{0s}$$

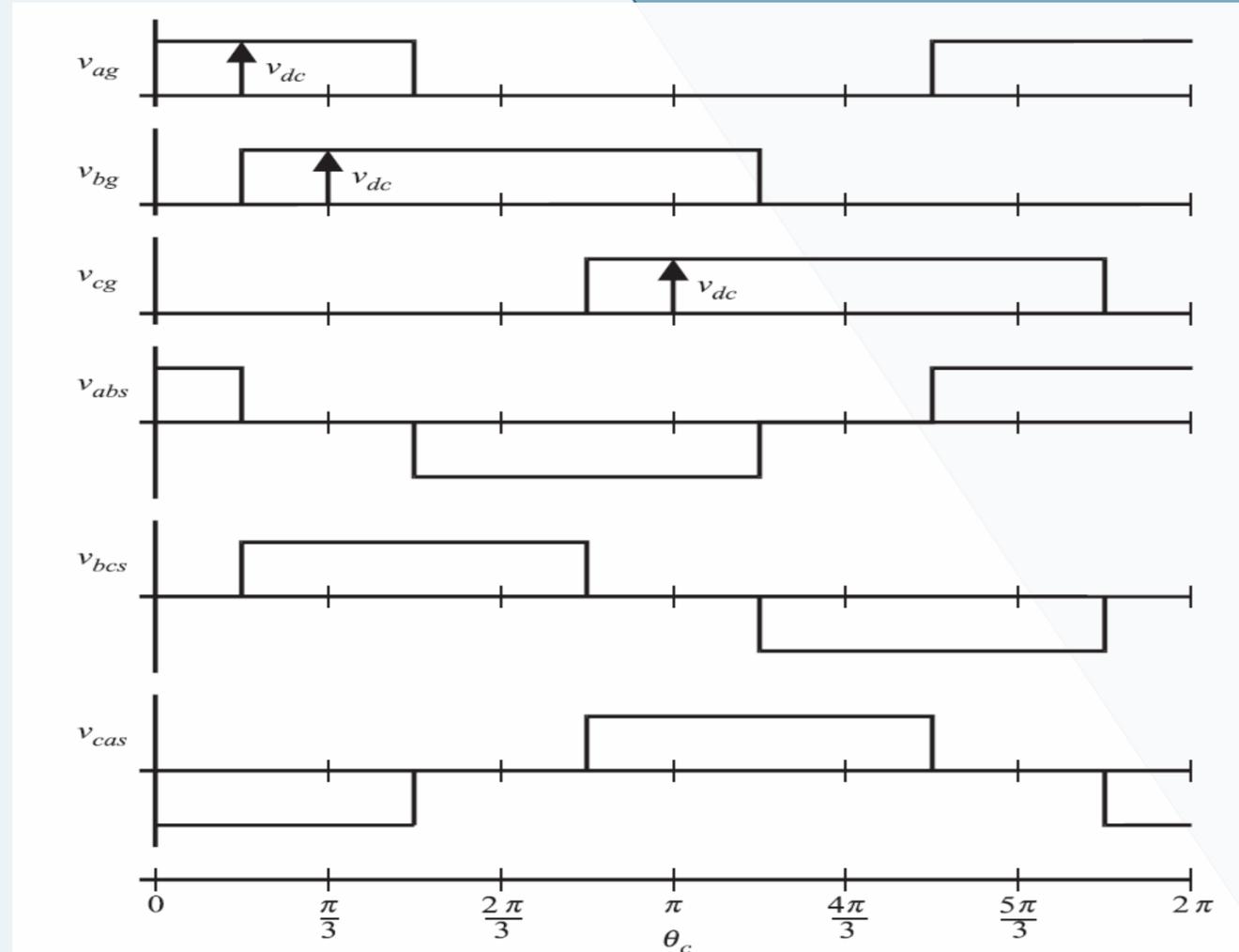
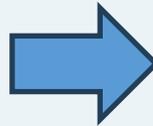
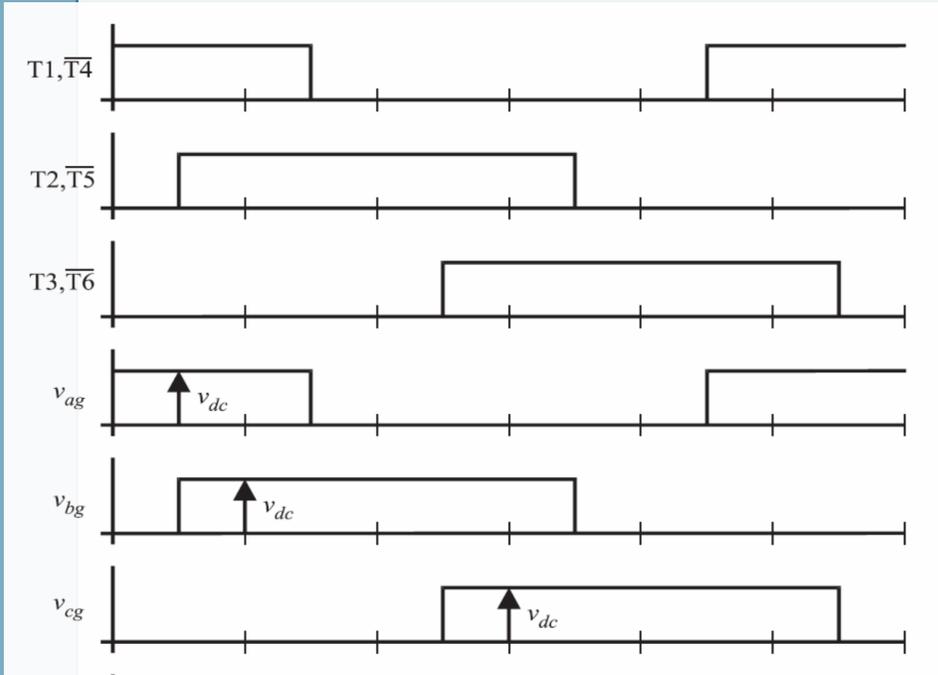
$$v_{ng} = \frac{1}{3}(v_{ag} + v_{bg} + v_{cg})$$

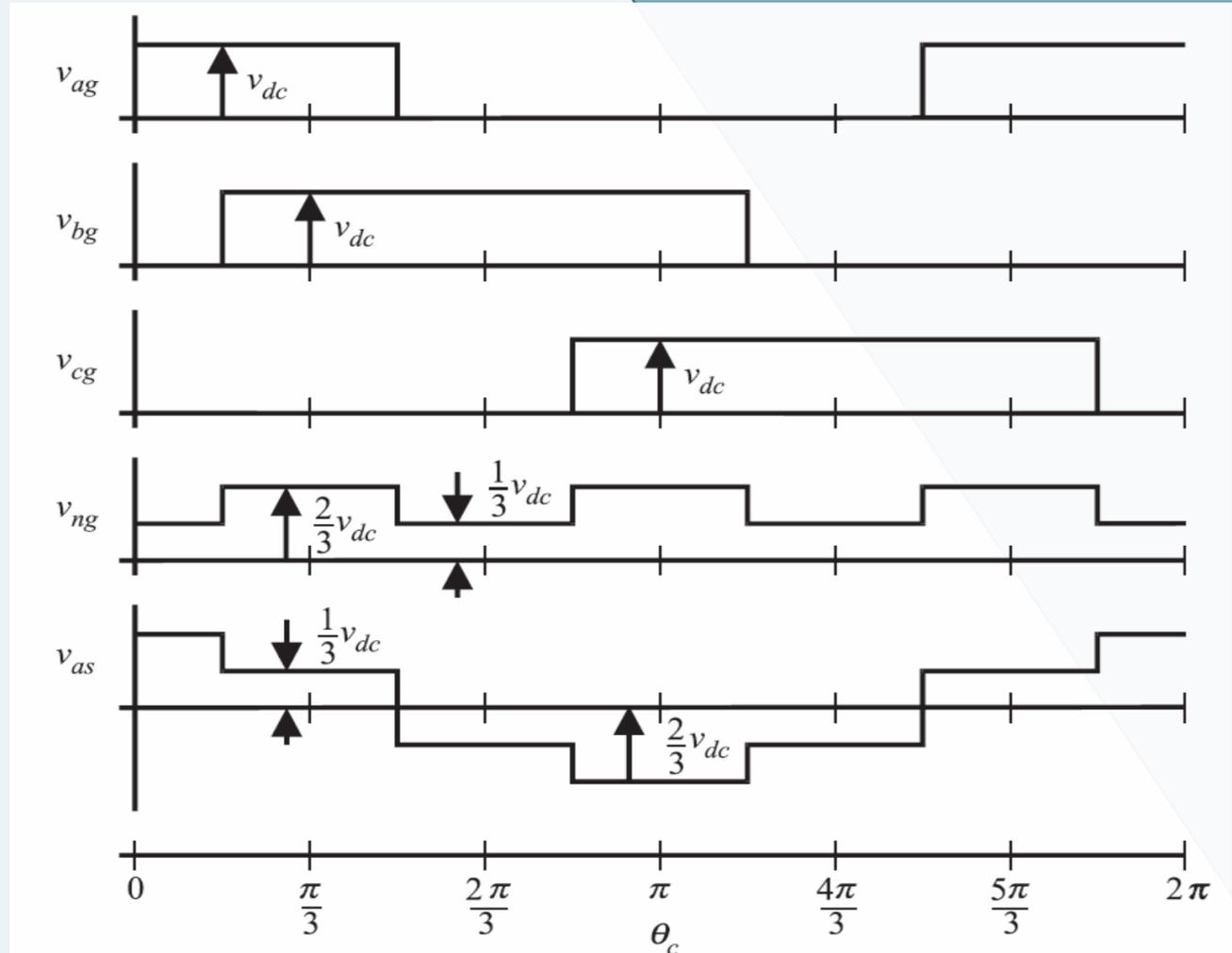
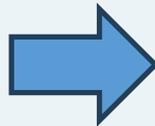
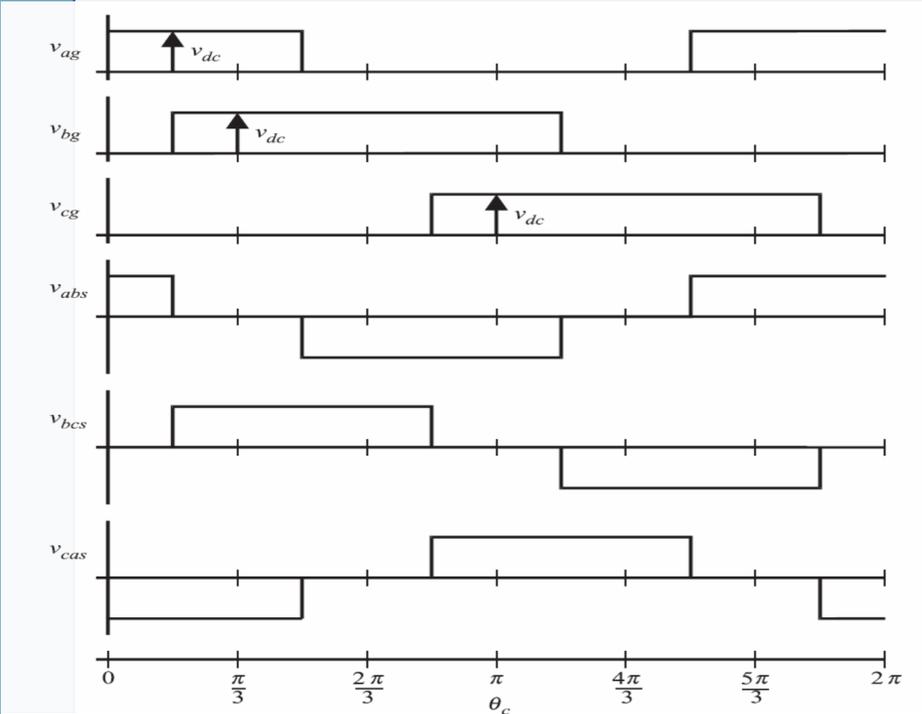
$$v_{as} = \frac{2}{3}v_{ag} - \frac{1}{3}v_{bg} - \frac{1}{3}v_{cg}$$

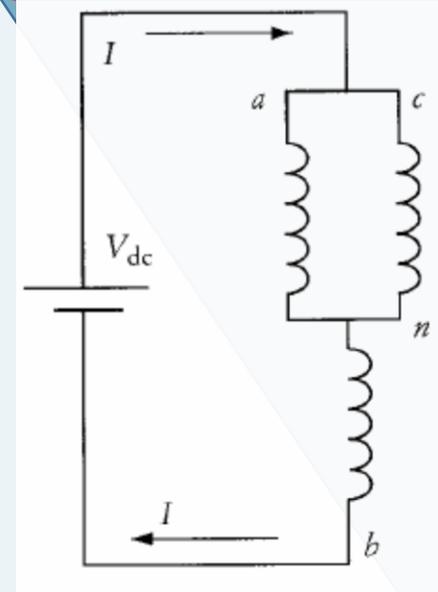
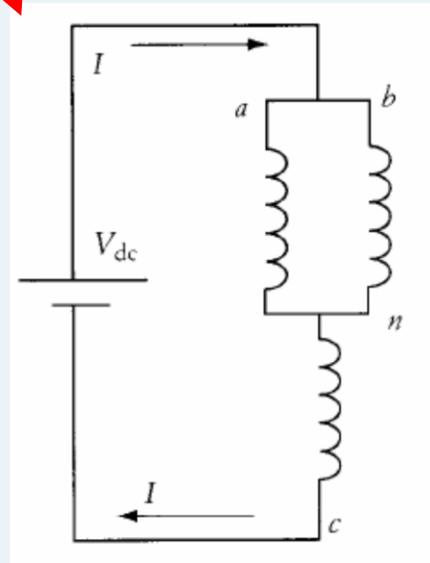
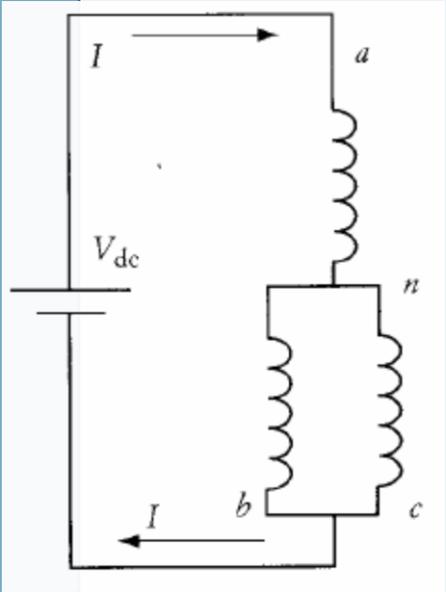
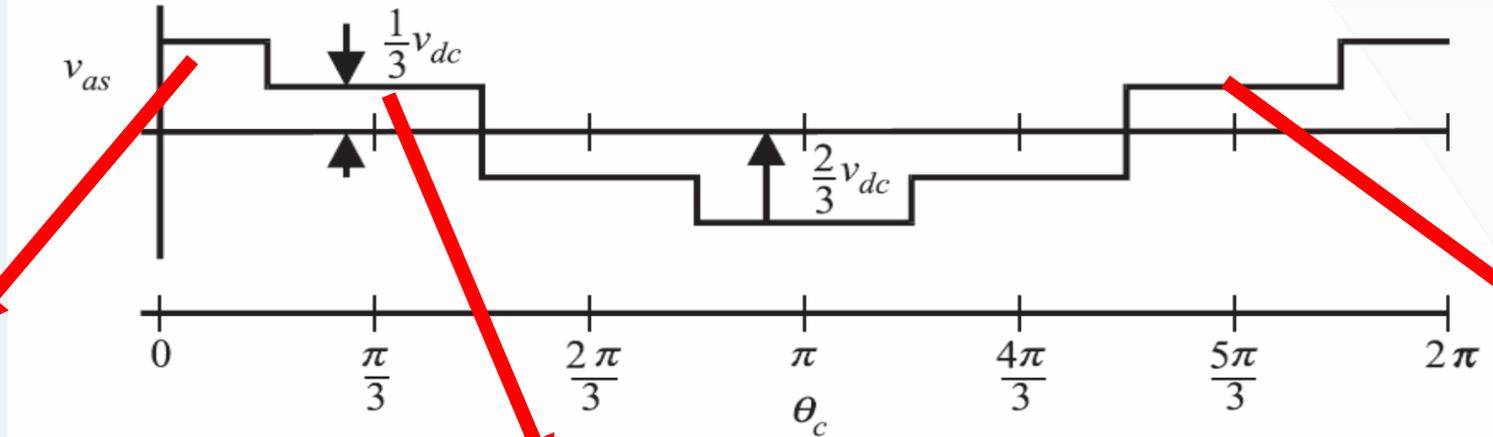
$$v_{bs} = \frac{2}{3}v_{bg} - \frac{1}{3}v_{ag} - \frac{1}{3}v_{cg}$$

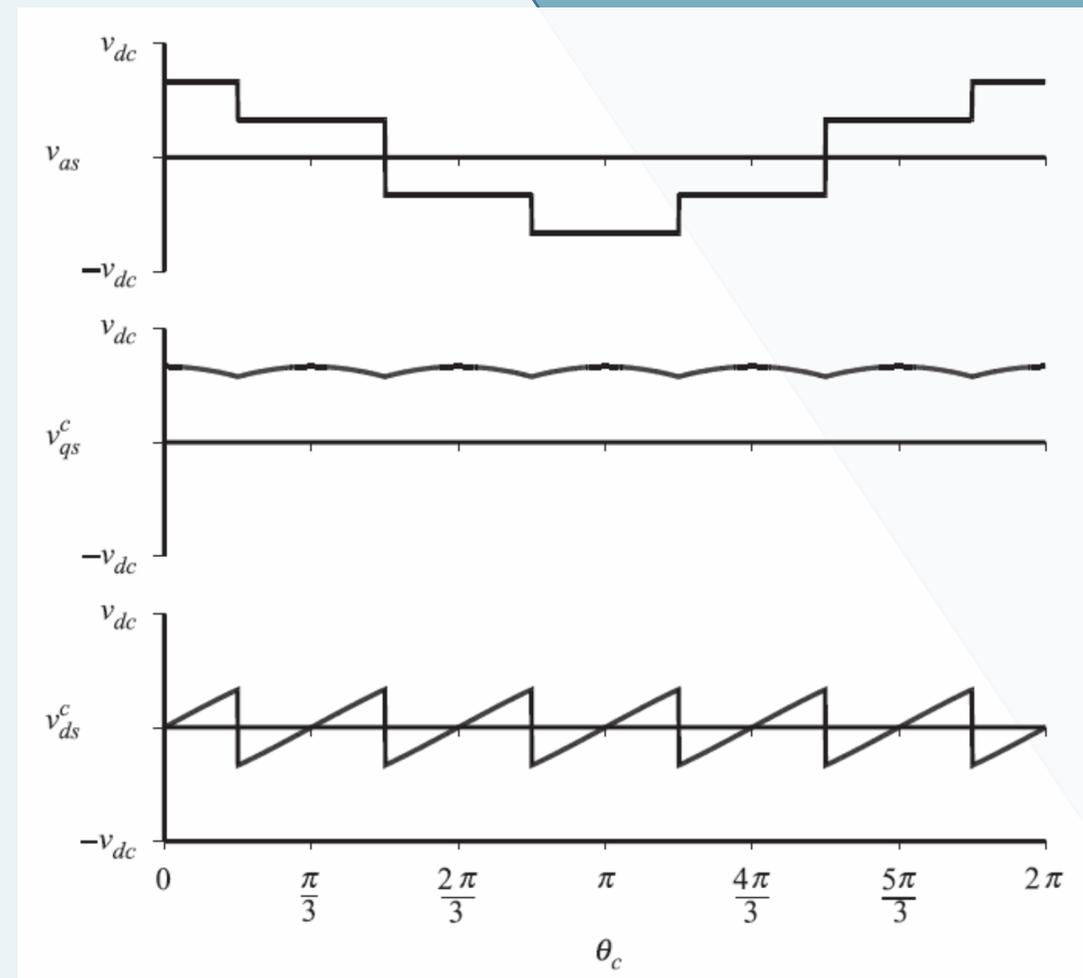
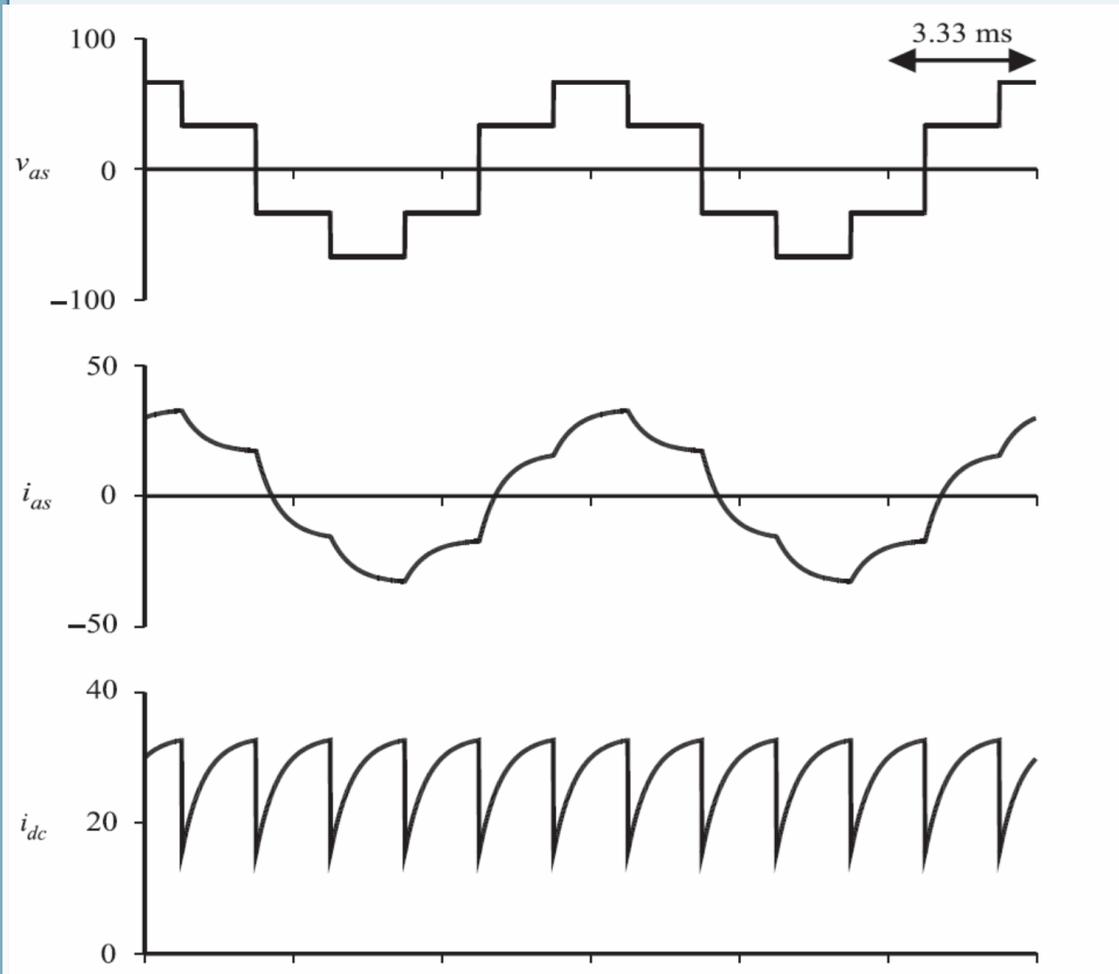
$$v_{cs} = \frac{2}{3}v_{cg} - \frac{1}{3}v_{ag} - \frac{1}{3}v_{bg}$$







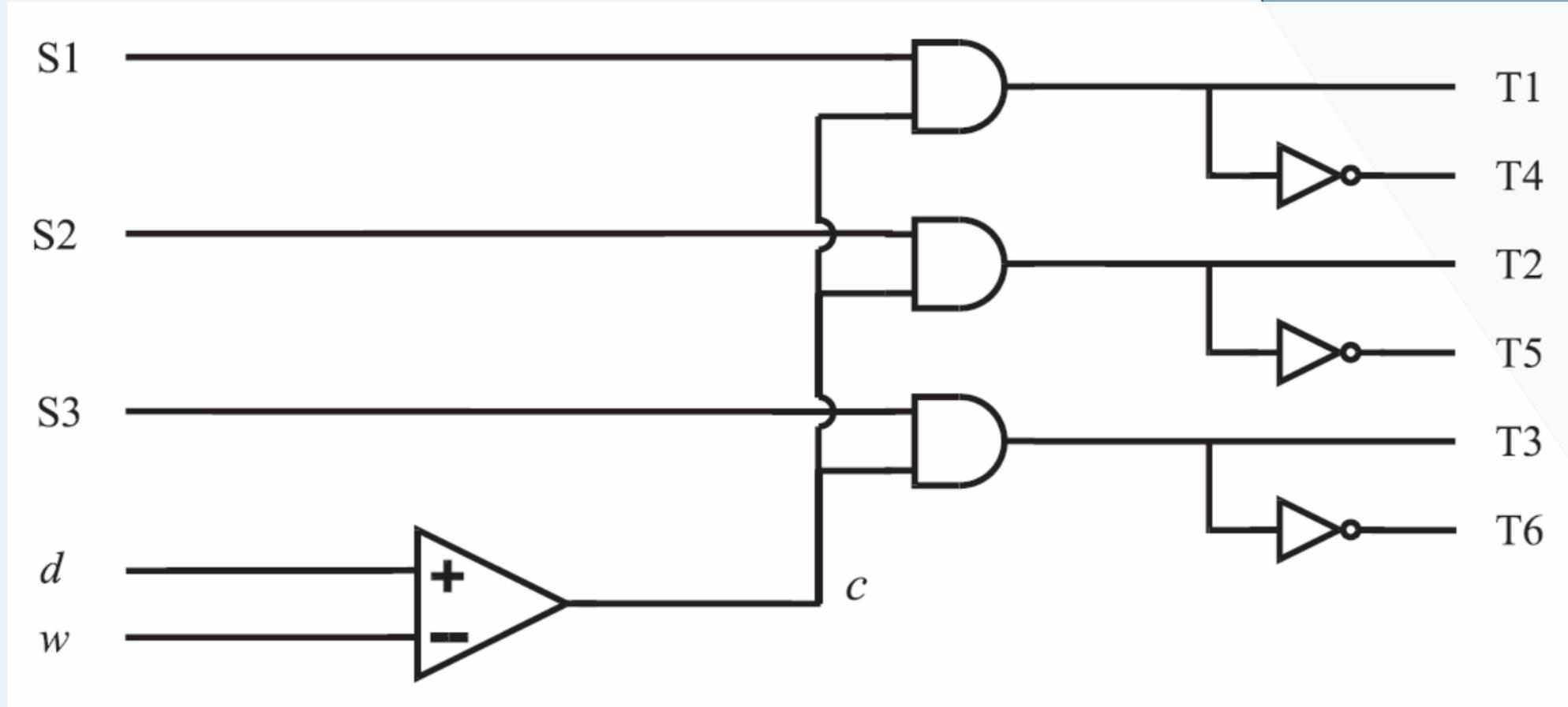


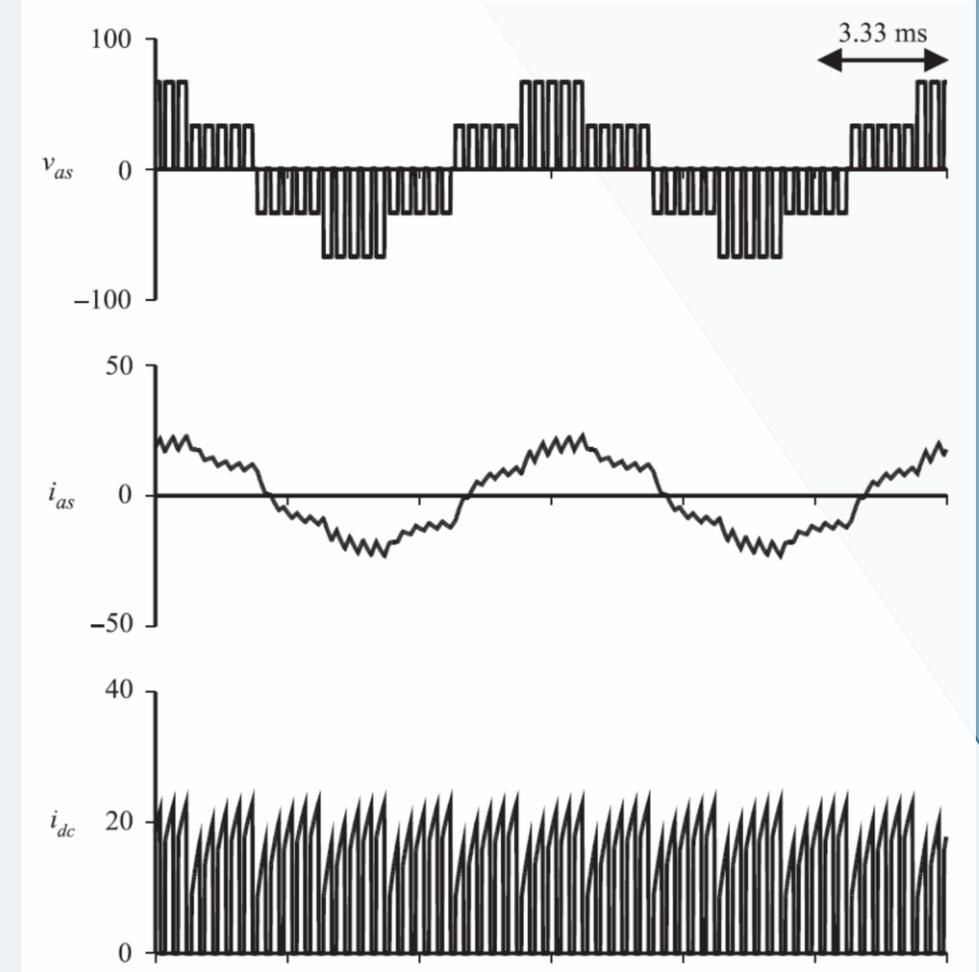
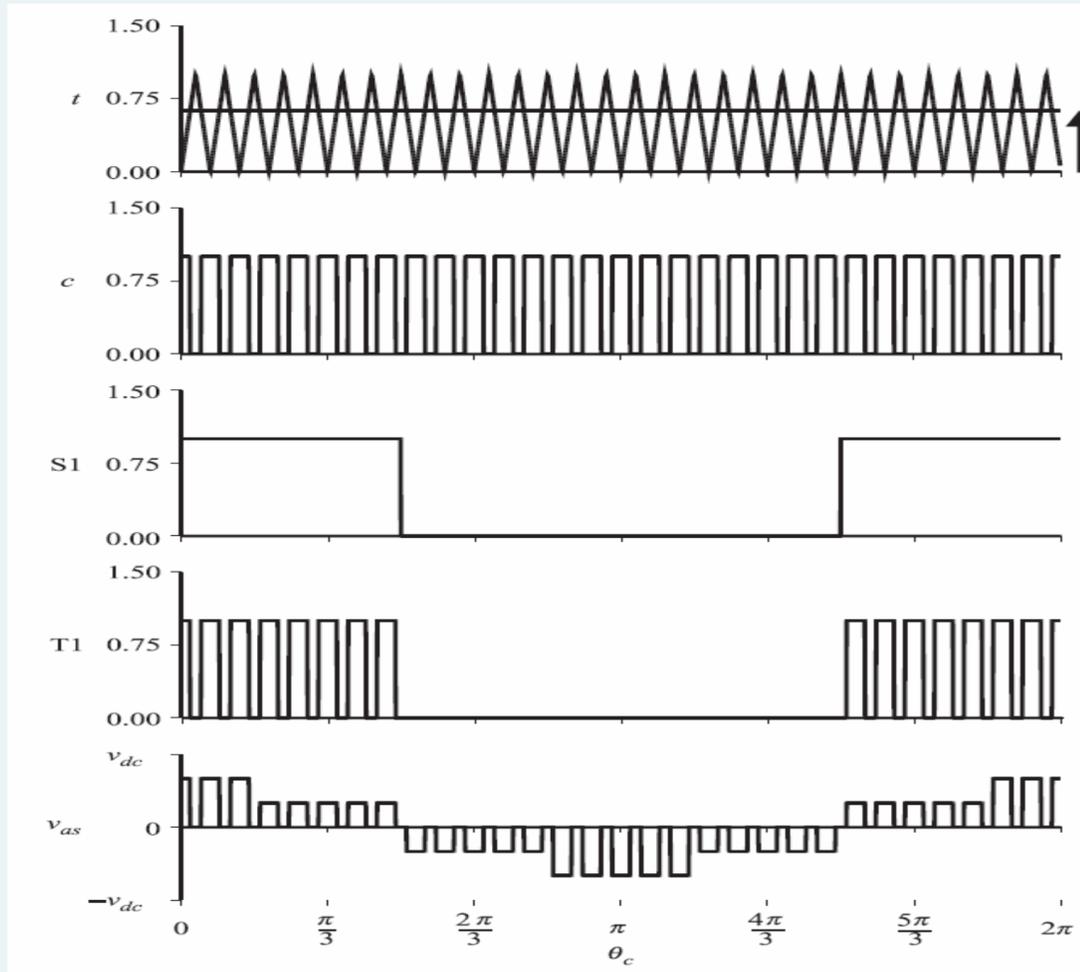


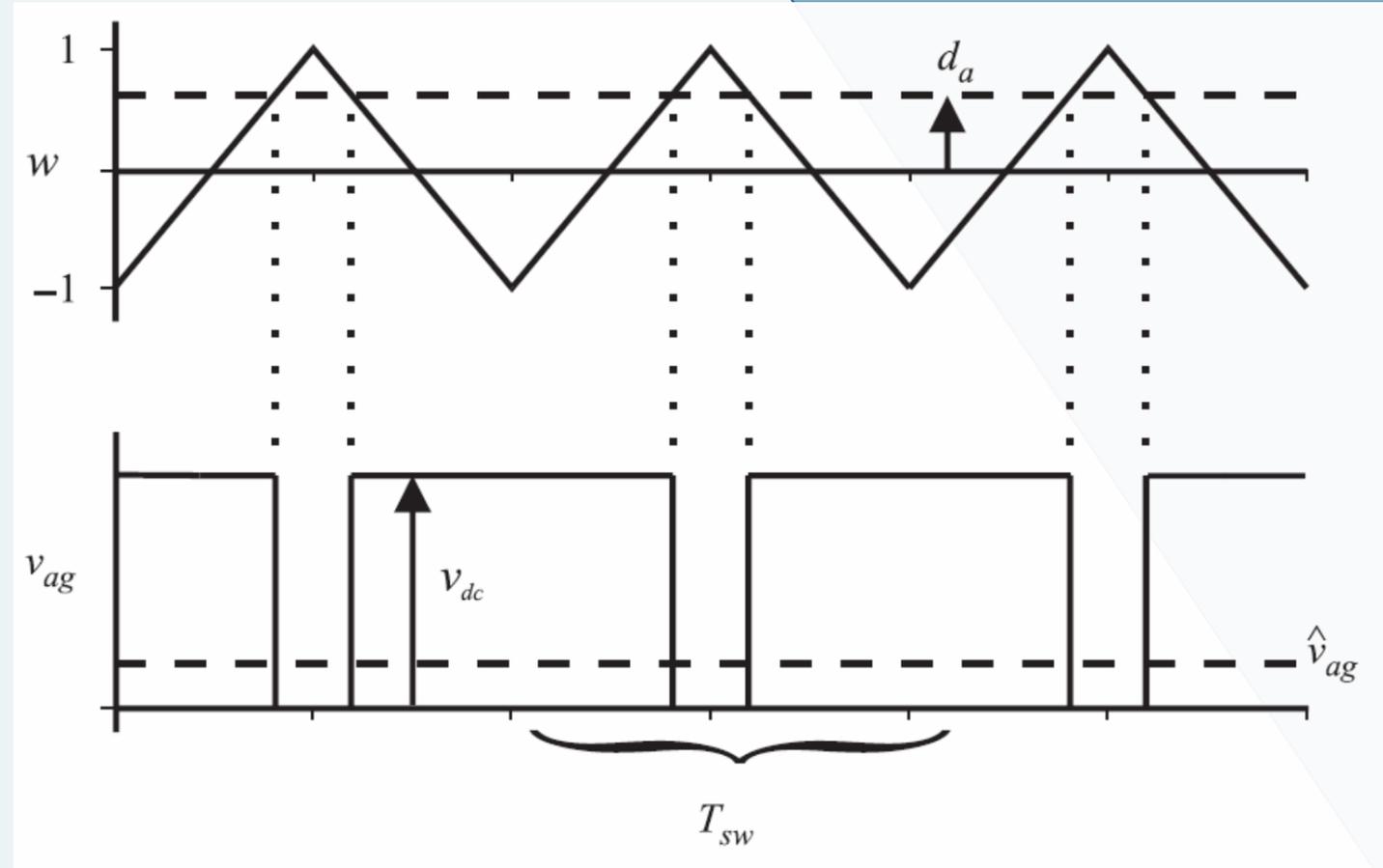
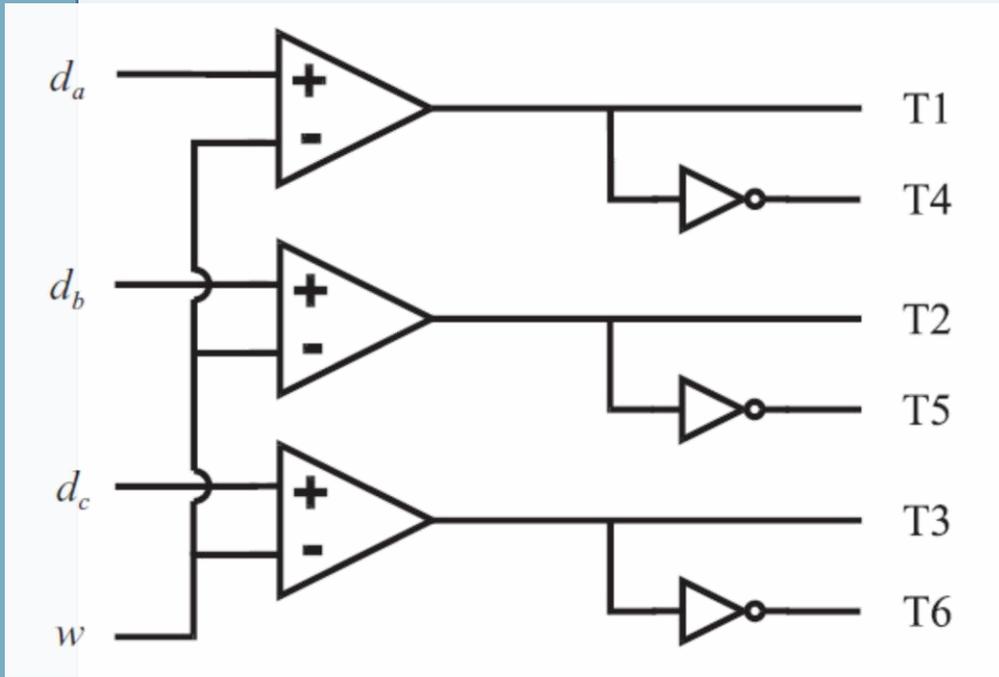
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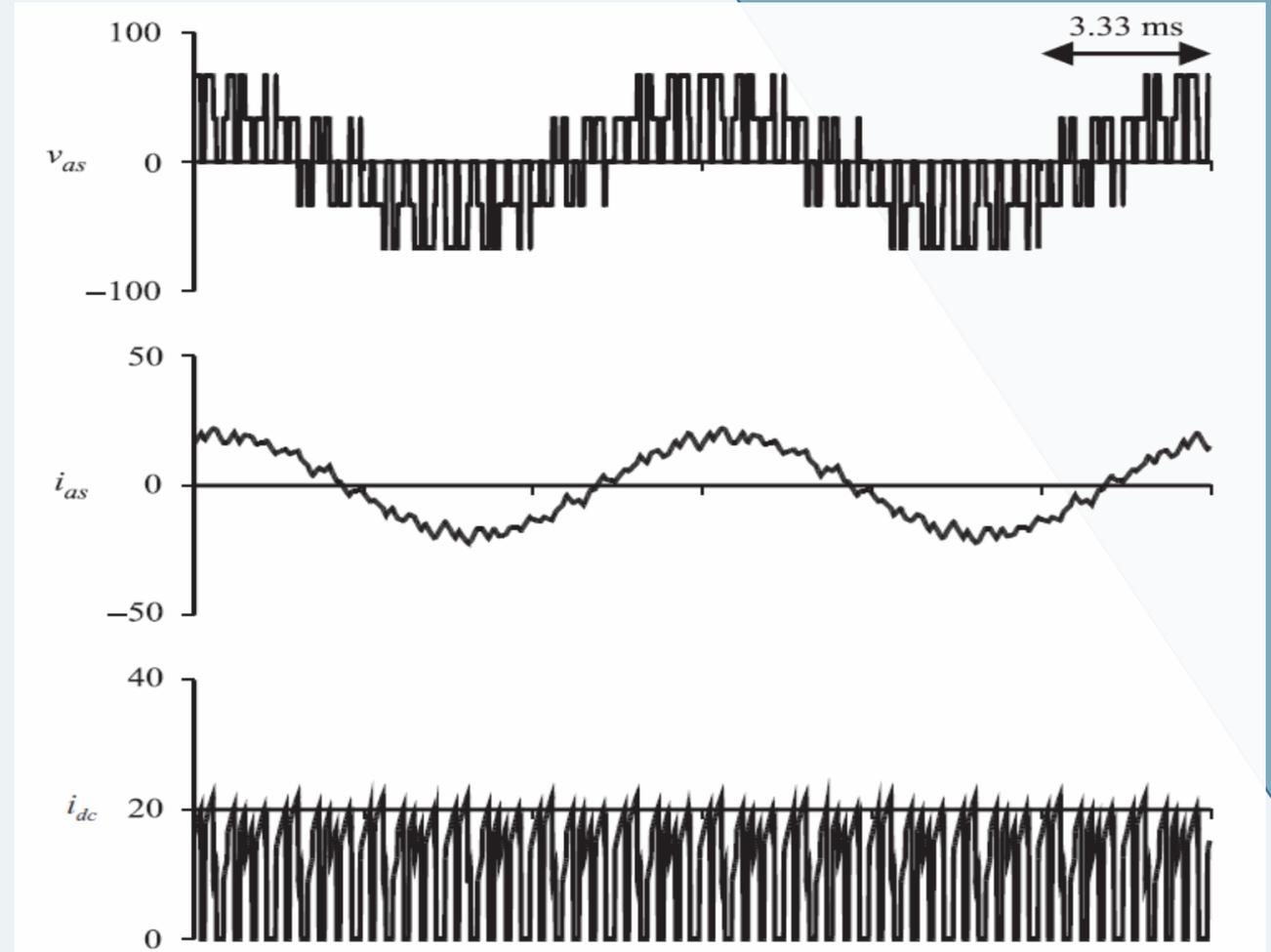
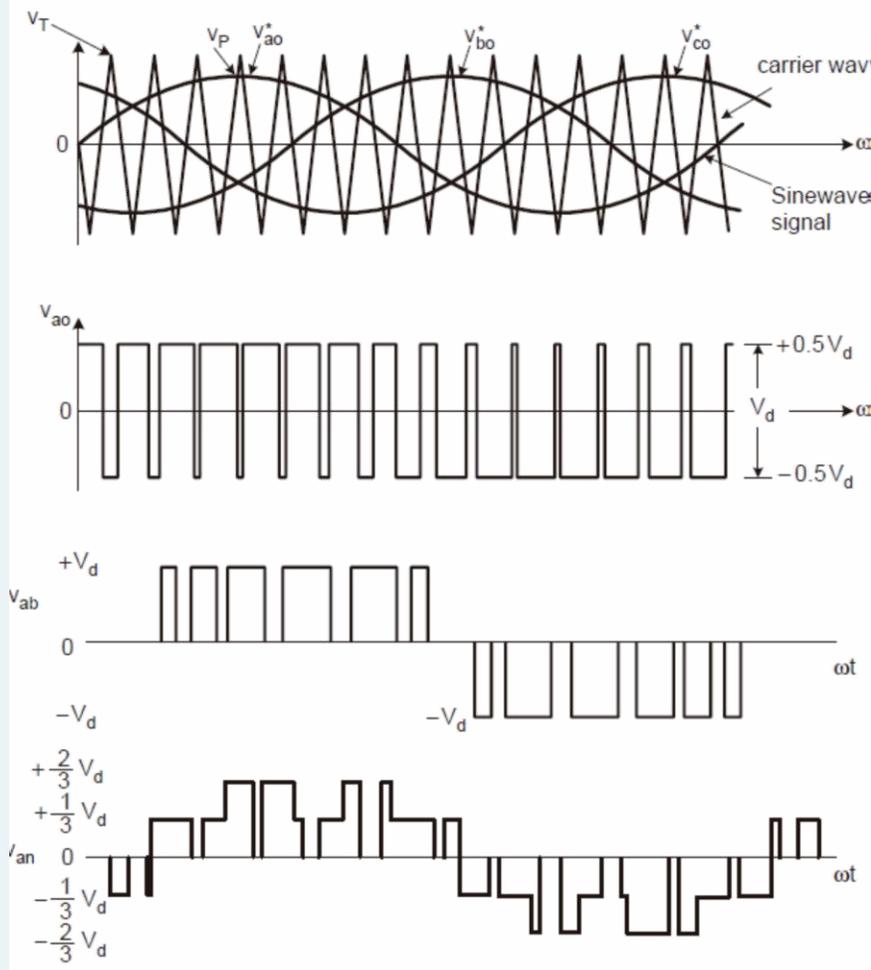
Máquinas Eléctricas (4.º “X”)
Máquinas e Instalaciones Eléctricas (4.º “R”)

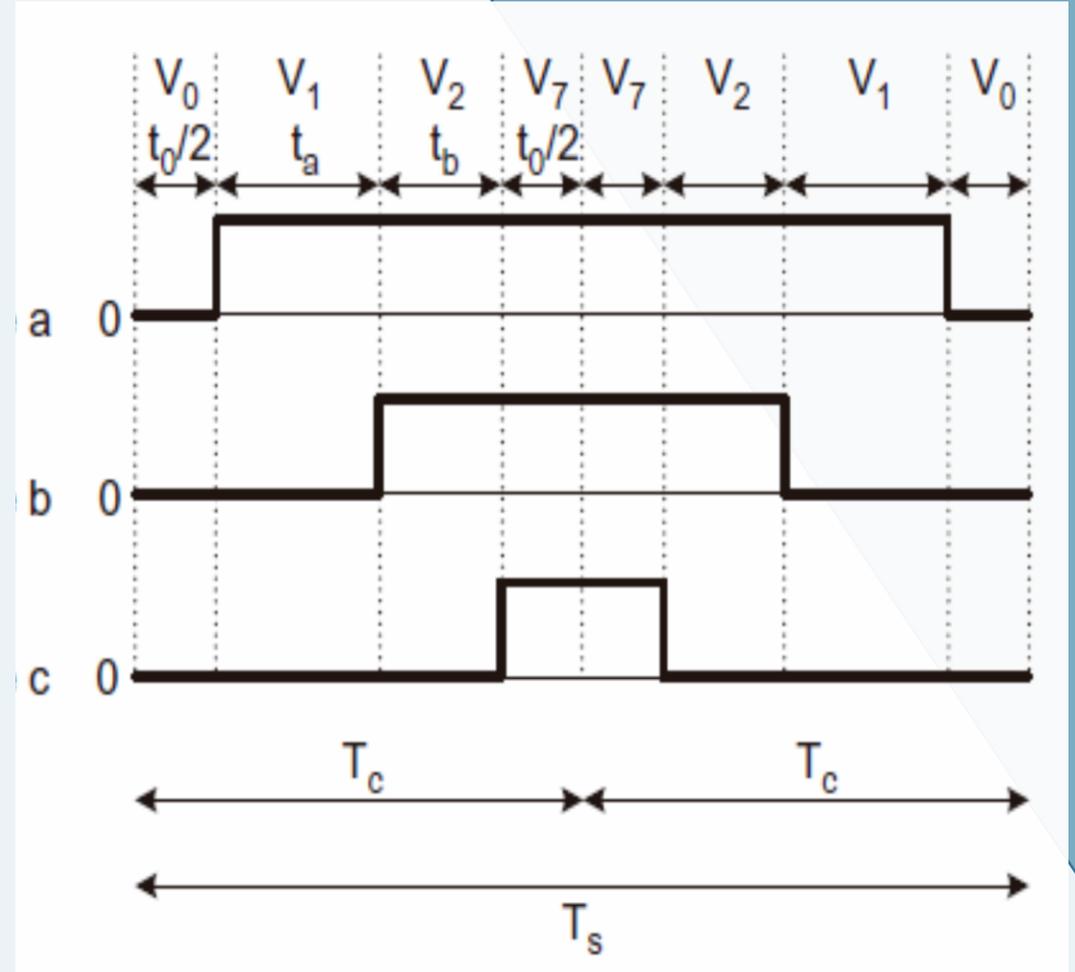
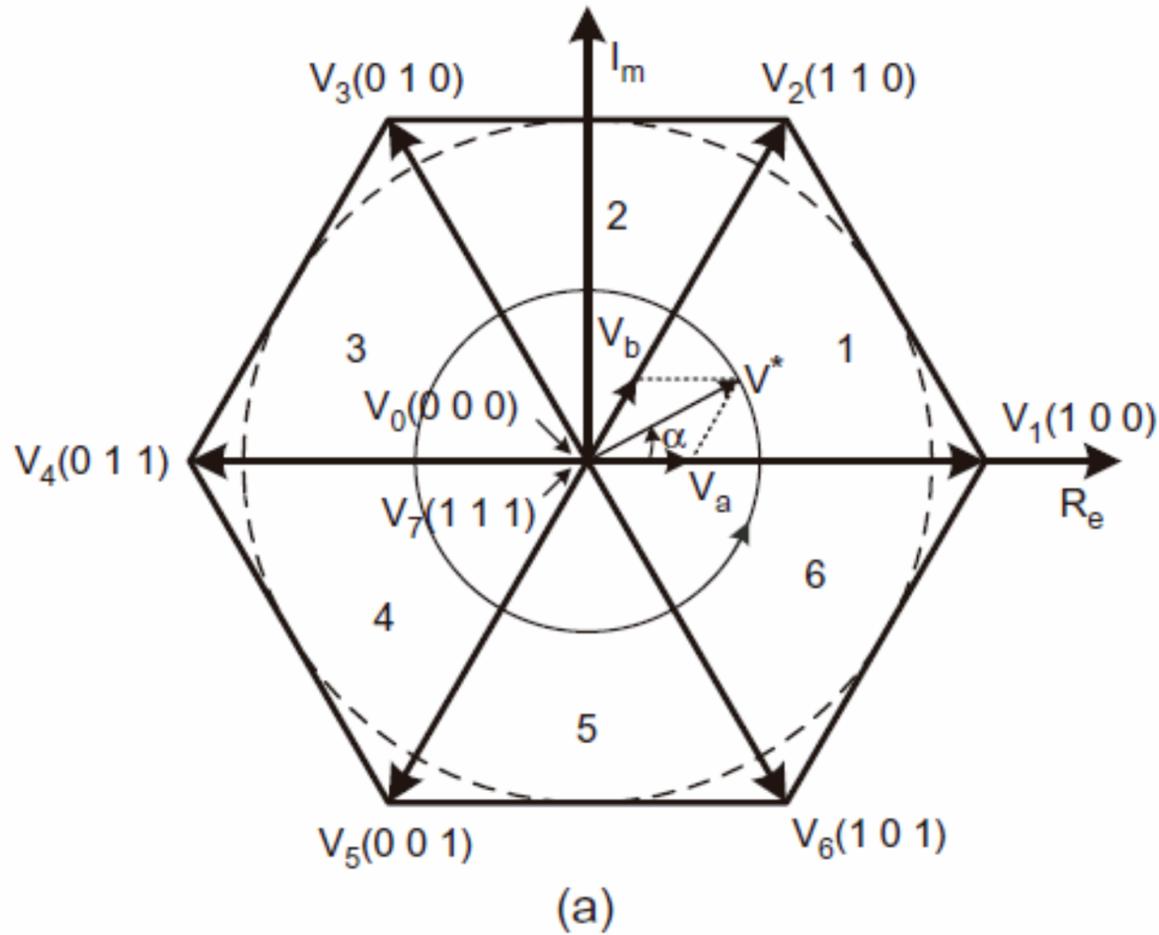
Convertidores trifásicos: algunas estrategias de modulación

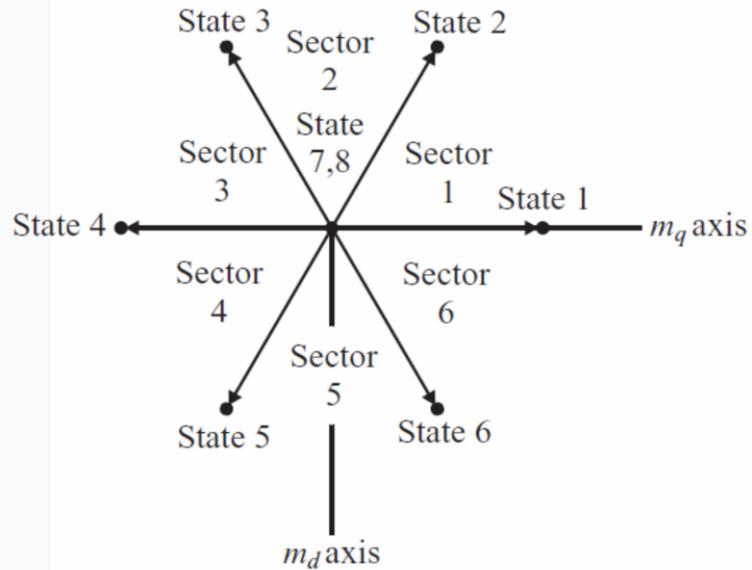




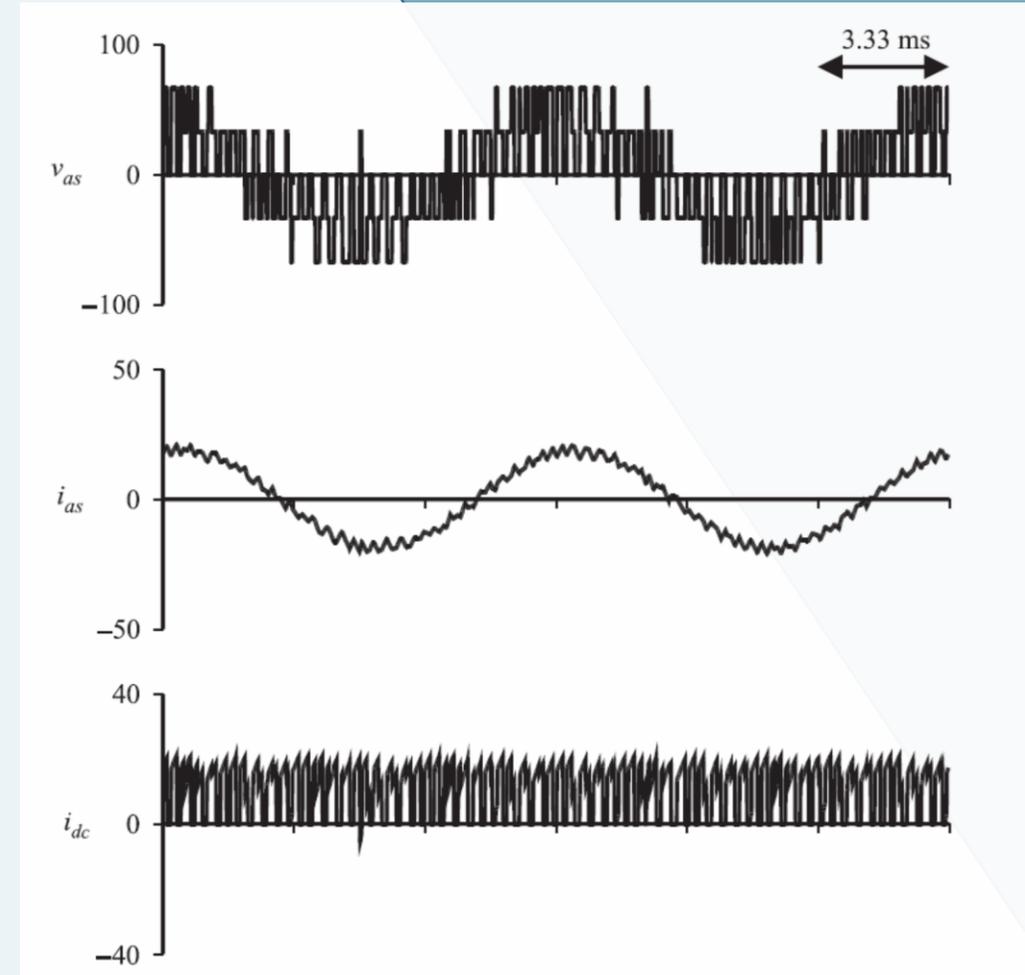
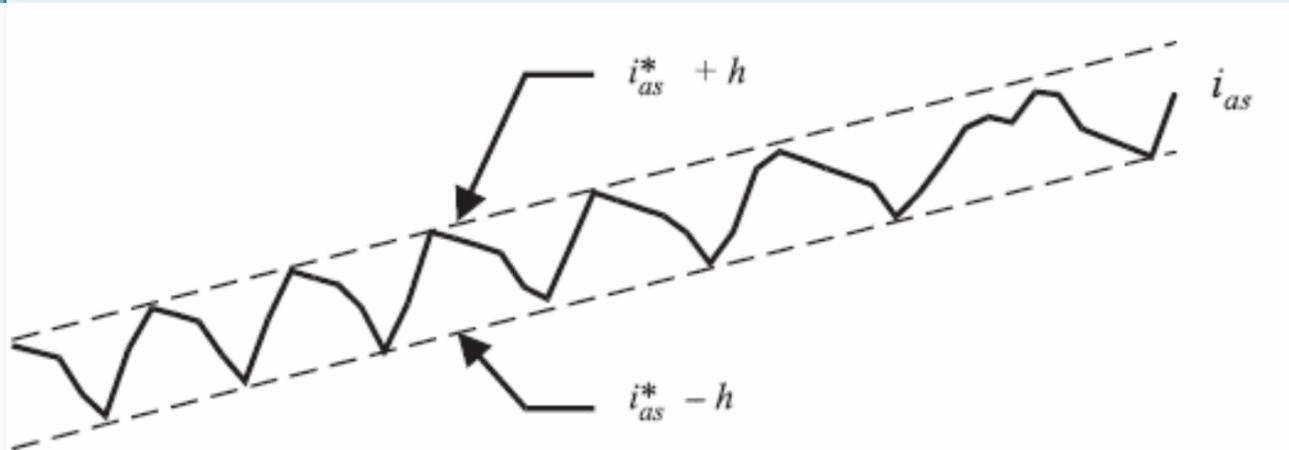
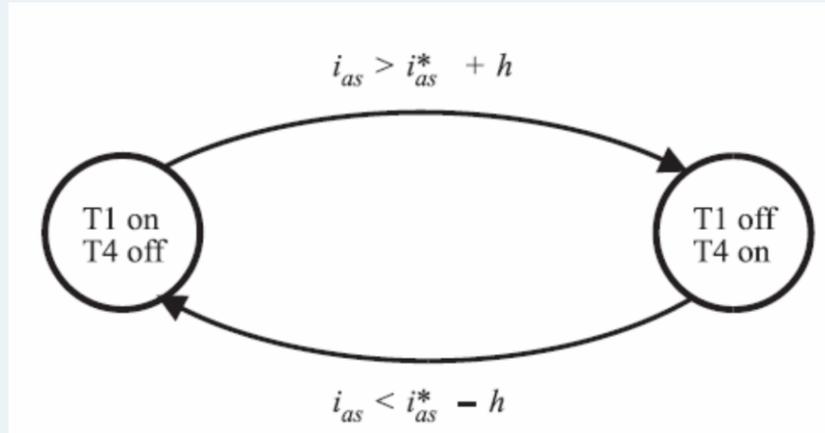








Sector	Initial State (α)	2nd State (β)	3rd State (γ)	Final State (δ)
1	7	2	1	8
2	7	2	3	8
3	7	4	3	8
4	7	4	5	8
5	7	6	5	8
6	7	6	1	8
1	8	1	2	7
2	8	3	2	7
3	8	3	4	7
4	8	5	4	7
5	8	5	6	7
6	8	1	6	7



Gracias por su atención

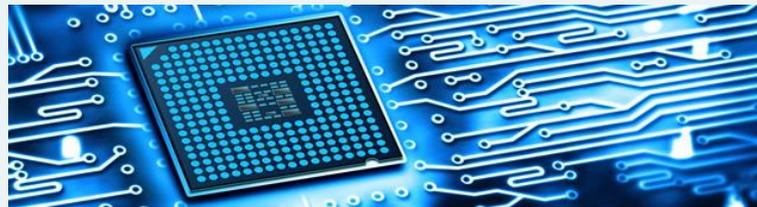
Material elaborado con la colaboración del Dr. Ing. Guillermo Bossio de la Facultad de Ingeniería de la UNRC



Máquinas Eléctricas

4.º nivel Ingeniería Electromecánica

Docentes: Dr. Ing. Diego M. Ferreyra || Ing. Pablo A. Ferrero



Máquinas e Instalaciones Eléctricas

4.º nivel Ingeniería Electrónica

Docentes: Dr. Ing. Diego M. Ferreyra || Esp. Ing. Raúl A. Beinotti

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