

Paris Session 2022



Losses in dc/dc converters connected to HVDC links

B4 PS1 Question 1.17

How do DC-DC converters compare with other types of AC-DC converters in terms of power losses?

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Group Discussion Meeting

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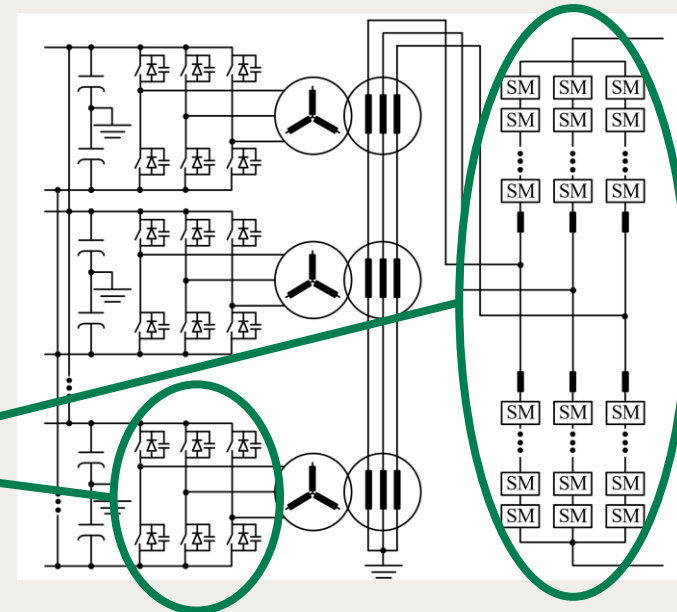
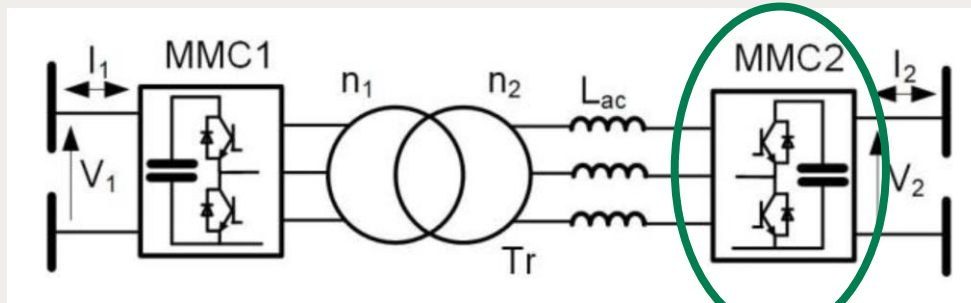
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Indirect topologies

- Figures from CIGRE technical brochures 827 and 875



- AC/DC converters **but** can be different from classical ac/dc converters

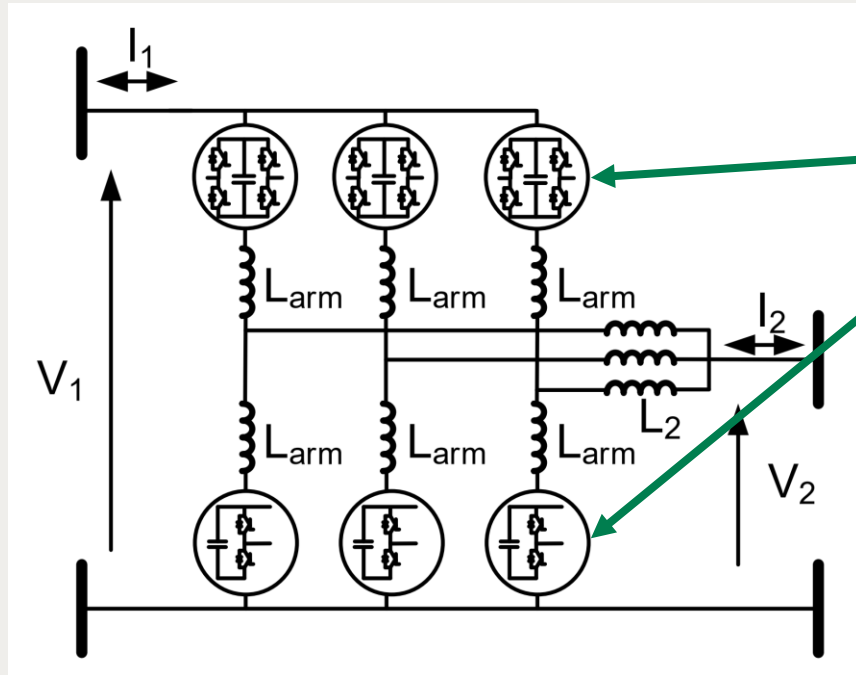
- Possible different waveforms (frequency and shape)
- Different expected fault behavior
- Possible different number of phases

- Impact on losses
- Impact on technological choices

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Direct topologies

- Figures from CIGRE technical brochures 827 and 875



- Same arms as in MMCs **but** different ratio dc voltage vs ac voltage
- Different switching losses
 - Impact of voltage balancing algorithm
 - Analytic formulae for MMCs not accurate

Losses in DC/DC converters connected to HVDC links

- No DC/DC converter connected to HVDC link → Models based on simulations
- Knowledge on existing HVDC VSCs cannot always be directly applied
- DC/DC converters vs AC/DC converters
 - Different constraints
 - Different degrees of freedom
 - **Additional opportunities to reduce losses** (and cost, footprint...)
- Special care on switching losses
 - Soft switching possible in some topologies
 - Impact of voltage balancing algorithm