

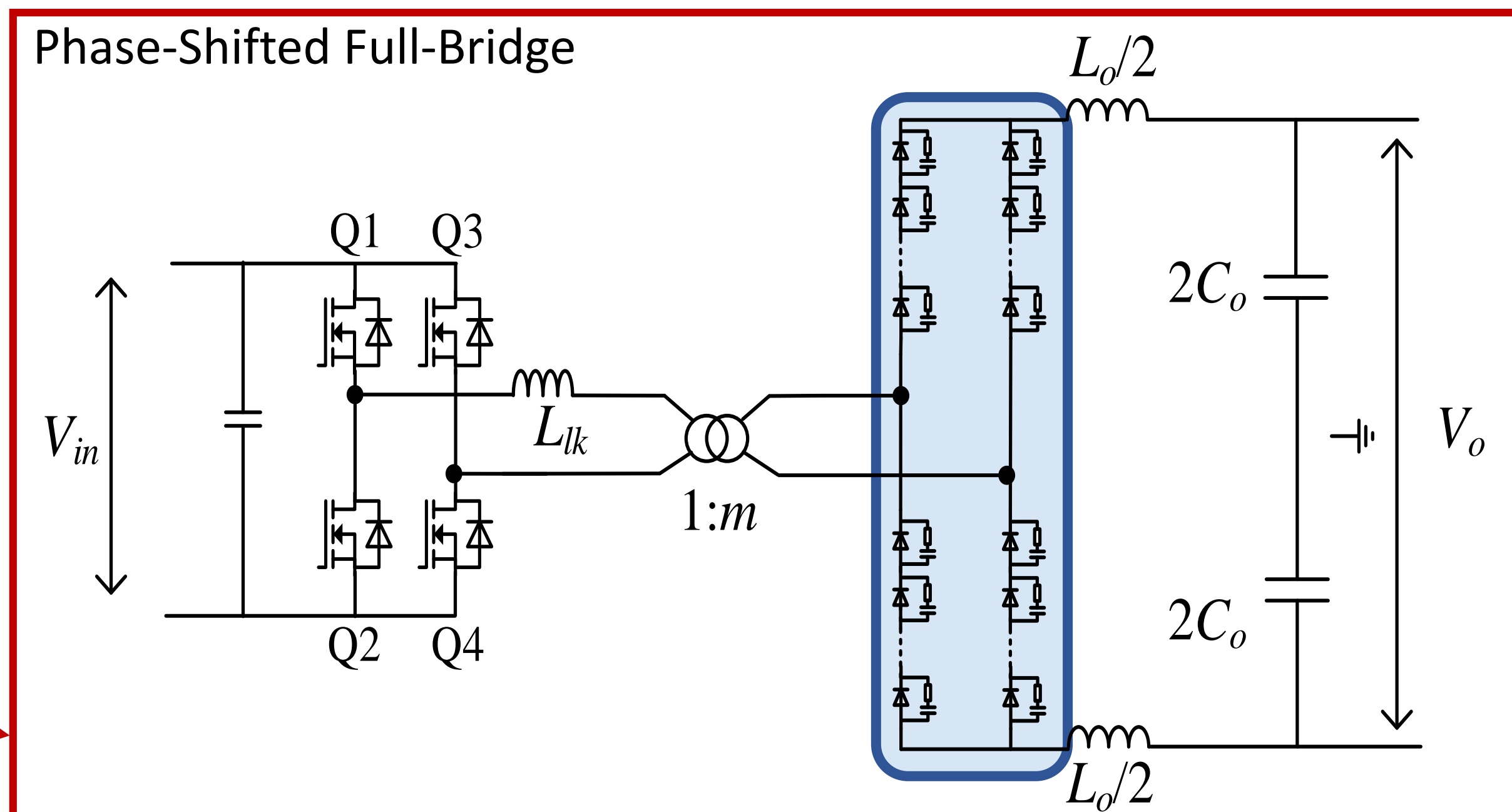
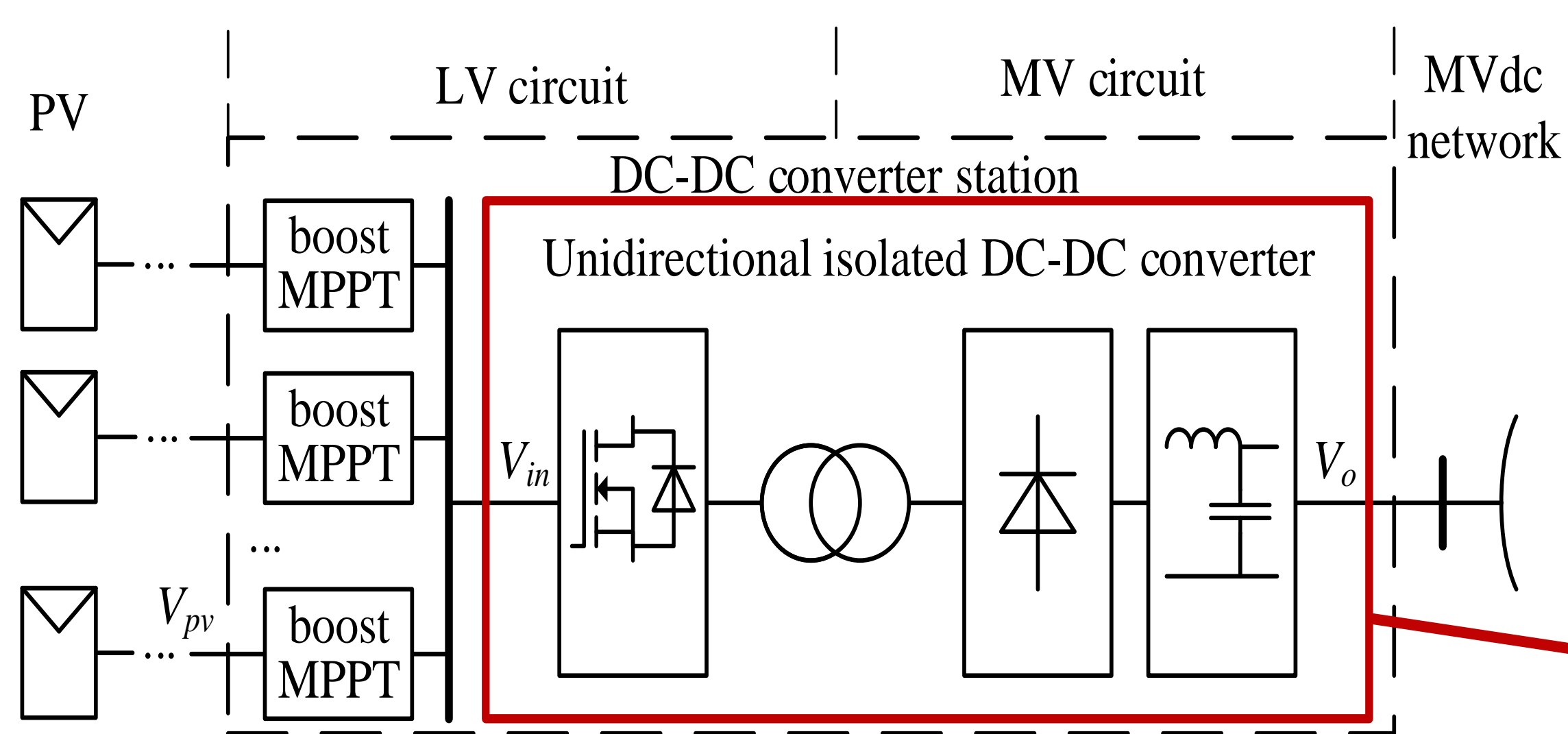
Medium Voltage Diode Rectifier Design for High Step-Up DC-DC Converter

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Context

DC/DC converter connecting PV to a MVdc collection network



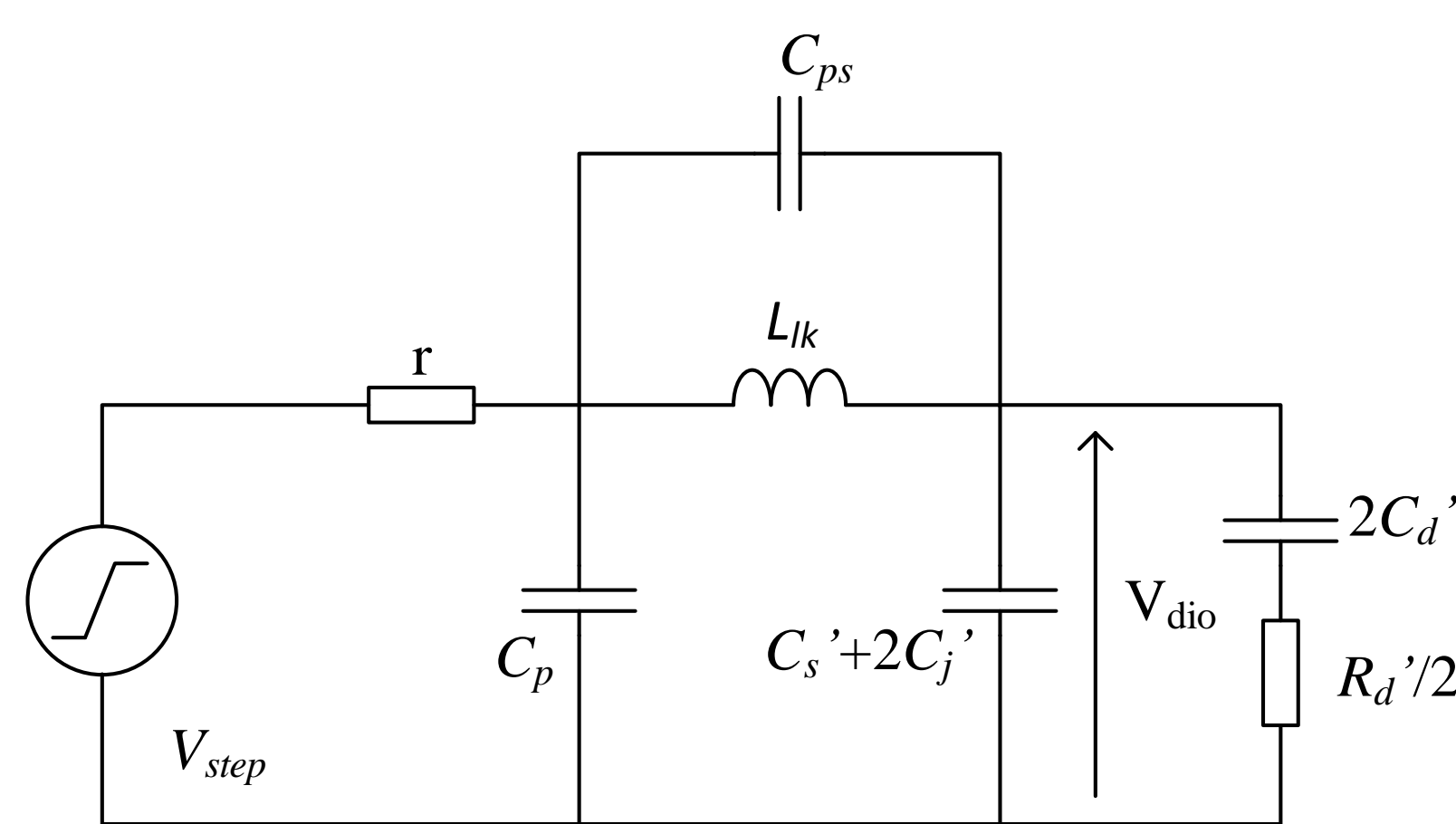
Inductor on MV side :

- Protects the diodes in case of MV fault
- Voltage ringing on rectifier voltage

Model

Voltage ringing phenomenon

- Model of the circuit at diode turn-off
- Takes into account primary bridge switching speed
- Enables fast design of snubber



Prototype

Rectifier specifications

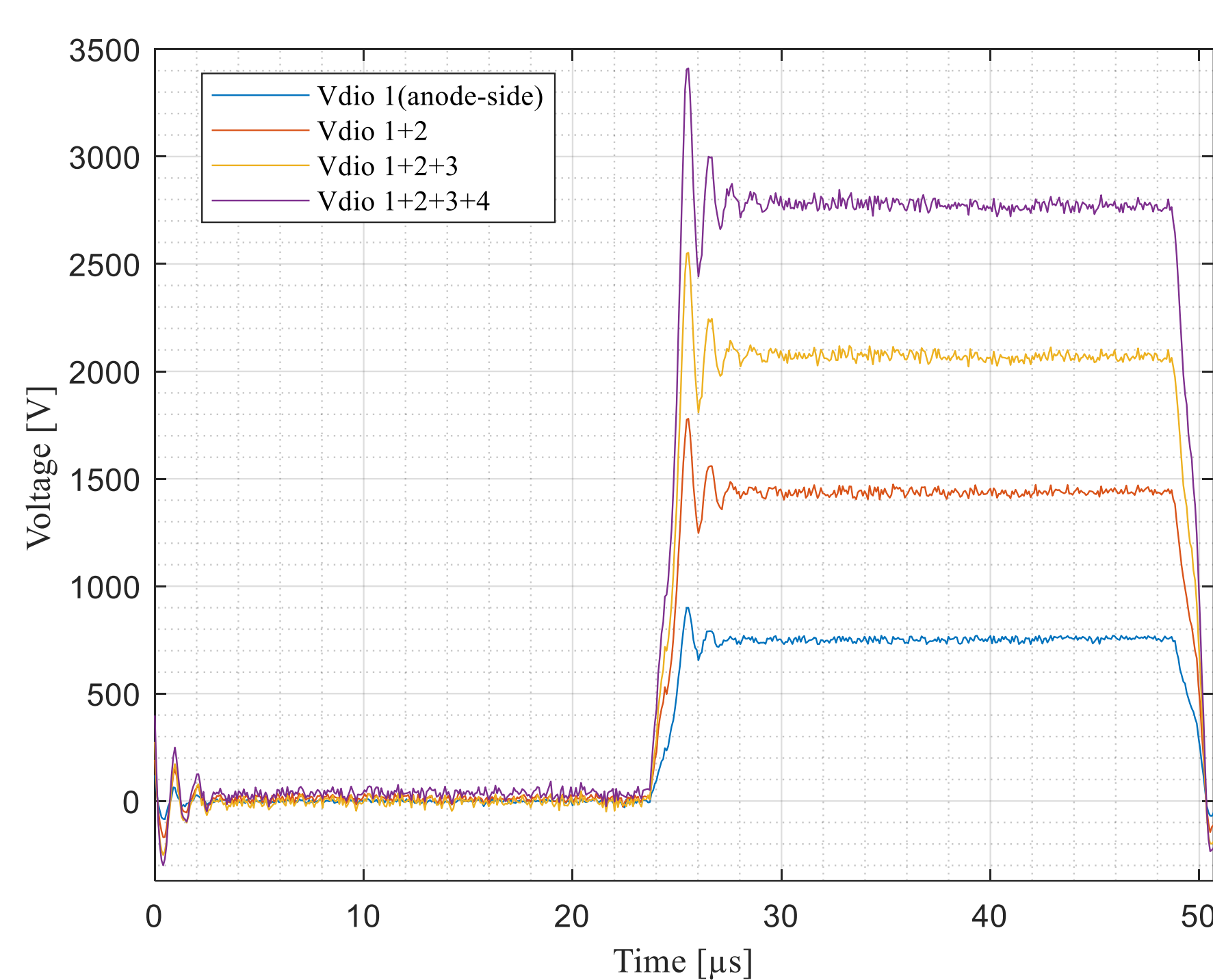
- Output voltage : 4 kV
- Output current : 12.5 A
- Switching frequency : 20 kHz
- Series connection : 4 x 1.7 kV SiC Schottky diodes
- Dynamic balancing and overvoltage limitation : RC snubbers
- Natural convection air cooling



Results

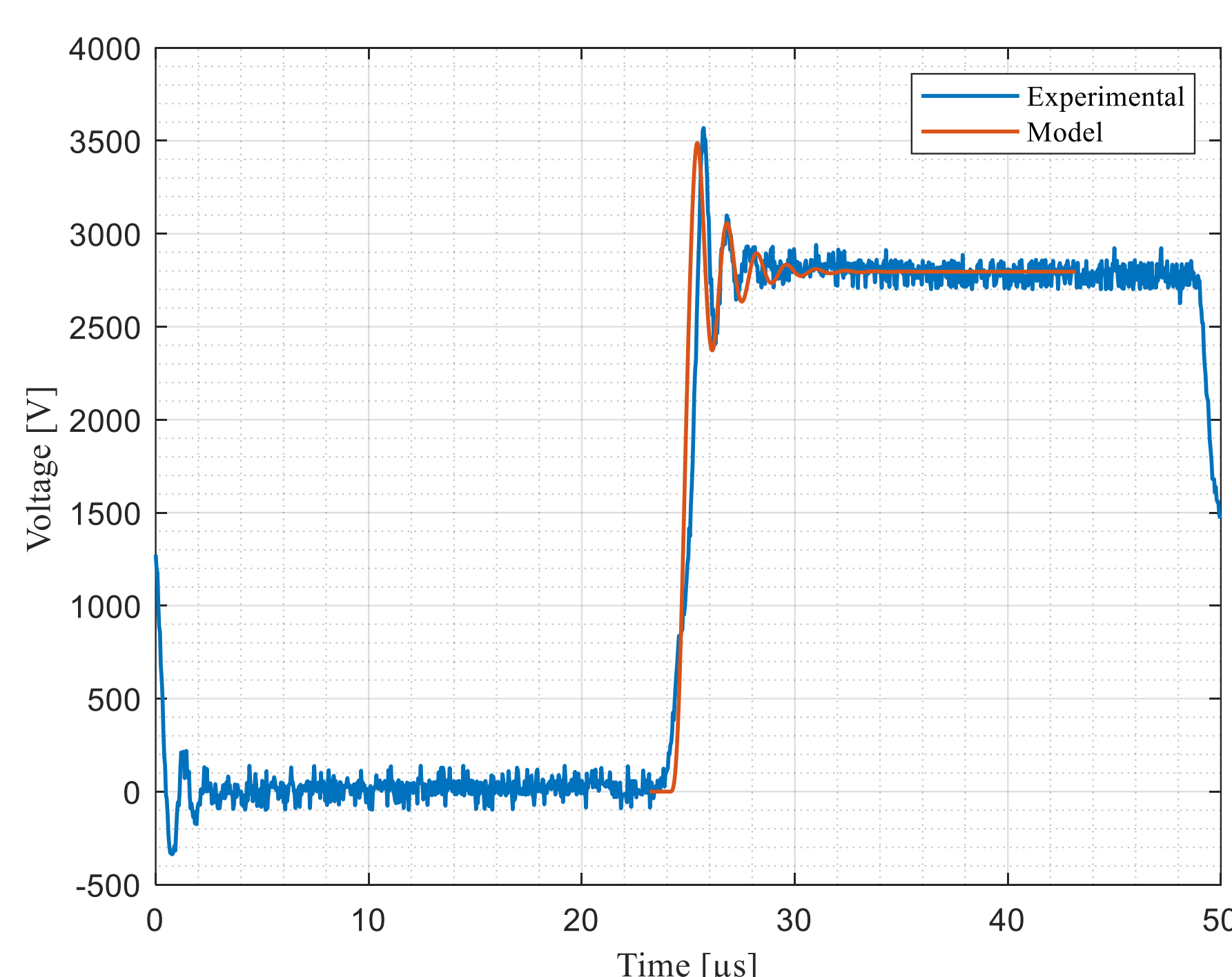
Voltage balancing

- Maximum voltage imbalance : 10% of nominal diode voltage



Voltage ringing

- Overvoltage limited to 25% of the diode string voltage
- Good prediction from the model



Conclusions/Perspectives

Conclusions

- Design of SiC based medium voltage diode rectifier, detailed in the paper
- Model enabling fast snubber design taking into account the voltage ringing mitigation

Perspectives

- Final design for higher voltage using oil immersion
- Integration within a complete medium voltage DC-DC converter