CIRED 2023 International
Conference & Exhibition
on Electricity Distribution

Session 2:
POWER QUALITY AND ELECTROMAGNETIC COMPATIBILITY

Inhalt von Session 2

- Block 1: EMC, earthing and safety
- Block 2: Equipment related power quality aspects
- Block 3: System related power quality aspects
- Block 4: Standards, measurements, regulation and advanced data analysis

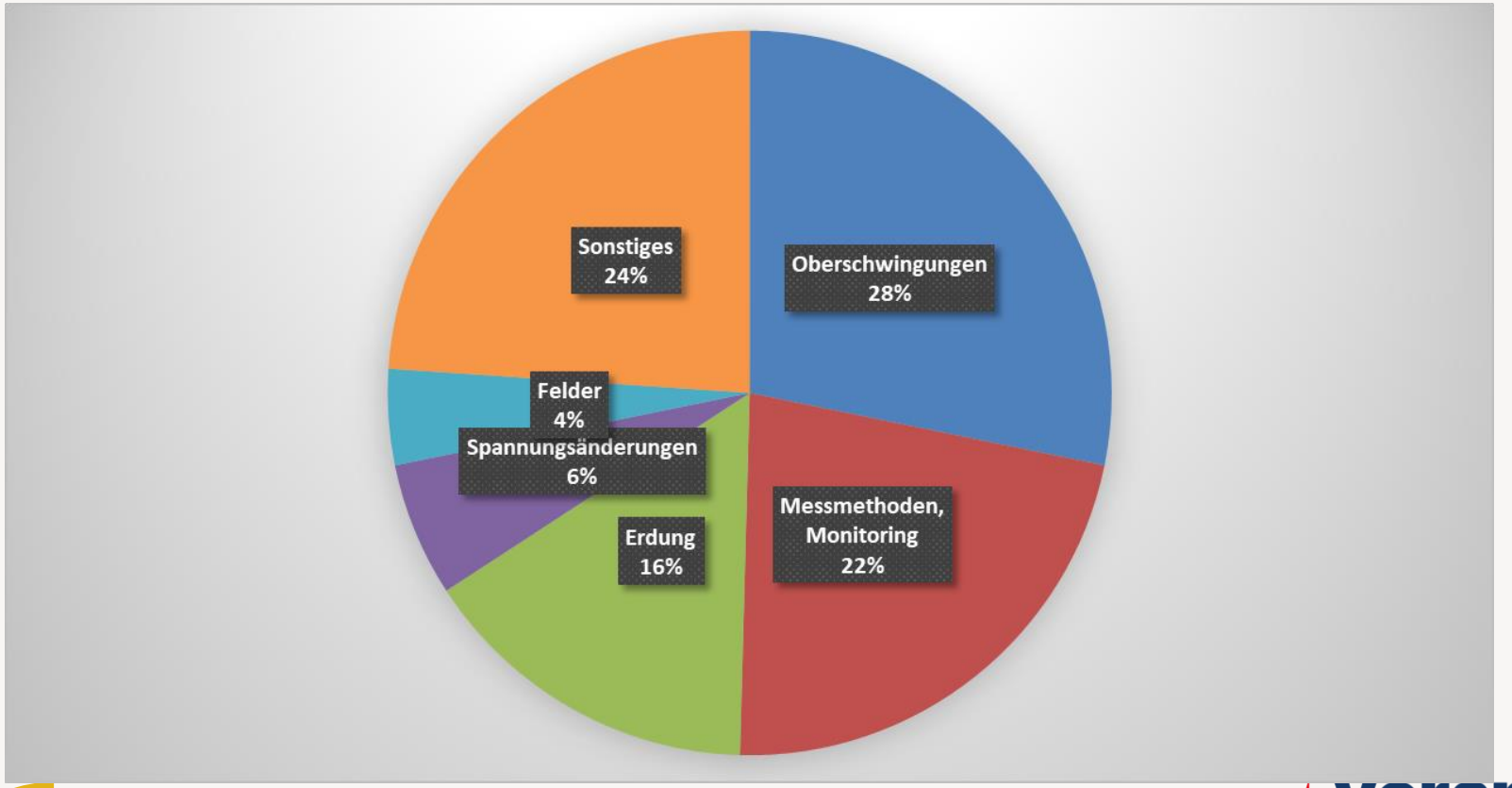
Das Team:

- Britta Heimbach, Schweiz
- Jan Meyer, Deutschland
- Jan Desmet, Belgien
- Herwig Renner, Österreich

Mit freundlicher Unterstützung von
Wiener Netze und Vorarlberg Netz

Themenaufteilung

- 140 Kurzfassungen
- 125 akzeptierte Vollbeiträge, davon 24 + 6 Vorträge



Mit freundlicher Unterstützung von
Wiener Netze und Vorarlberg Netz

Österreichische Beiträge

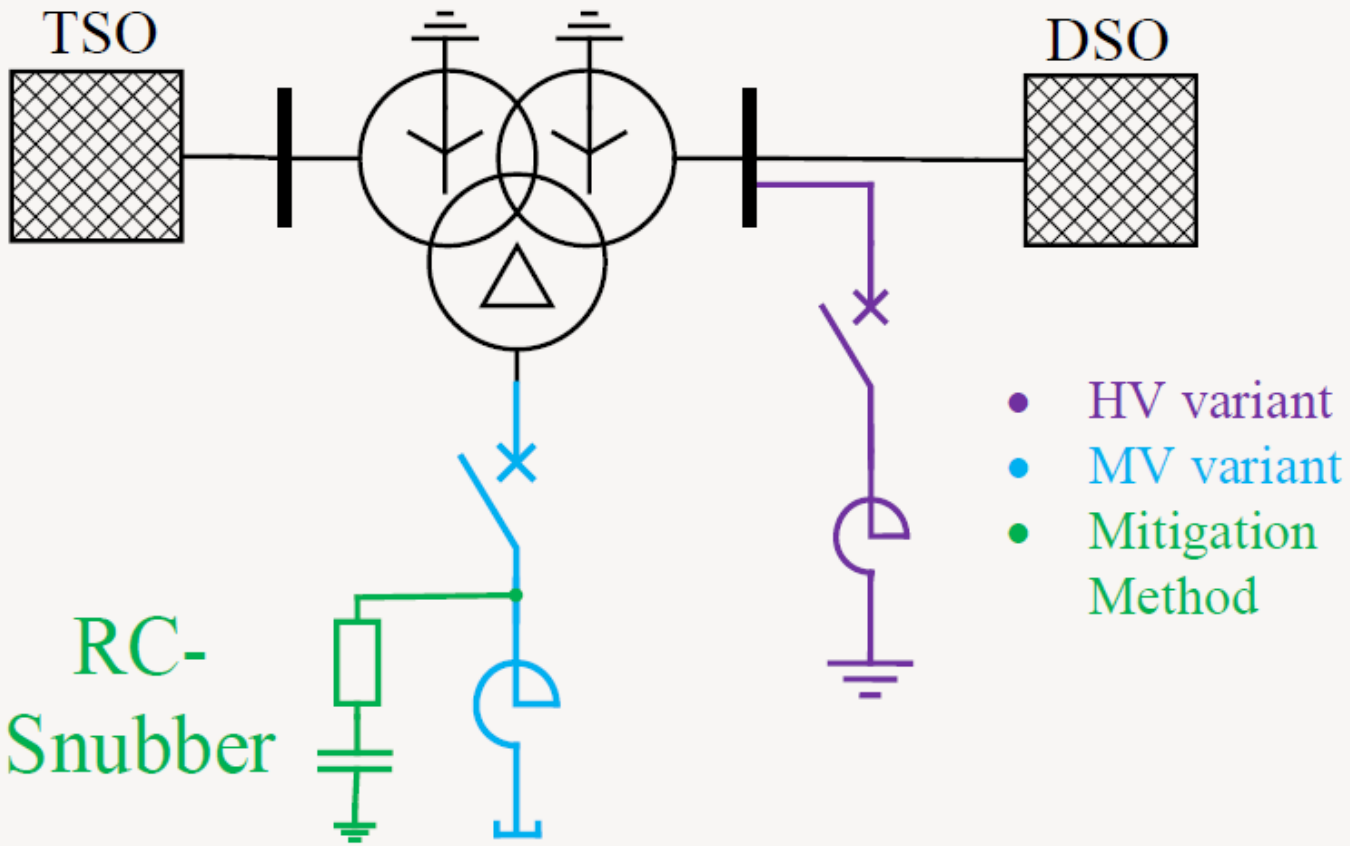
Medium Voltage Cable Network in the Mountains – Verification of the Earth Potential Rise Voltage by Calculation	Groiß, Friedl
Earth Resistivity Tomography Simulations Over an Earthing System	Jauk, Schürhuber, Friedl
Practical Comparison of Earth Impedance Testing Methods	Schmidbauer, Almer ★
Realistic Maximum Touch Voltages in Global Earthing Systems	Friedl, Fickert, Jauk, Schürhuber
Switching Overvoltages Caused by Shunt Reactor Switching and Mitigation Methods	Hackl, Friedl, Schürhuber, Heimbach, Wartmann, Casura ★
Investigations of 3D Meshed Earthing Systems	Fürnschuß, Pack, Schmautzer, Schürhuber
The Impact of a Bi-directional V2G Electric Vehicle Charging Station to the Frequency Dependent Grid Impedance (10 – 150 kHz)	Grasel, Baptista, Tragner, Puthenkalam ★
Requirements for Grid Supporting Inverter in Relation With Frequency and Voltage Support	Lehmal, Zhang, Renner, Schürhuber ★

★ Vortrag

Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Switching Overvoltages Caused by Shunt Reactor Switching and Mitigation Methods (0942 Philipp Hackl)

- More cables
- Flexible power flow
- Need of reactive power
- Use of shunt reactors
- Safe switching process?
- Mitigation Methods?



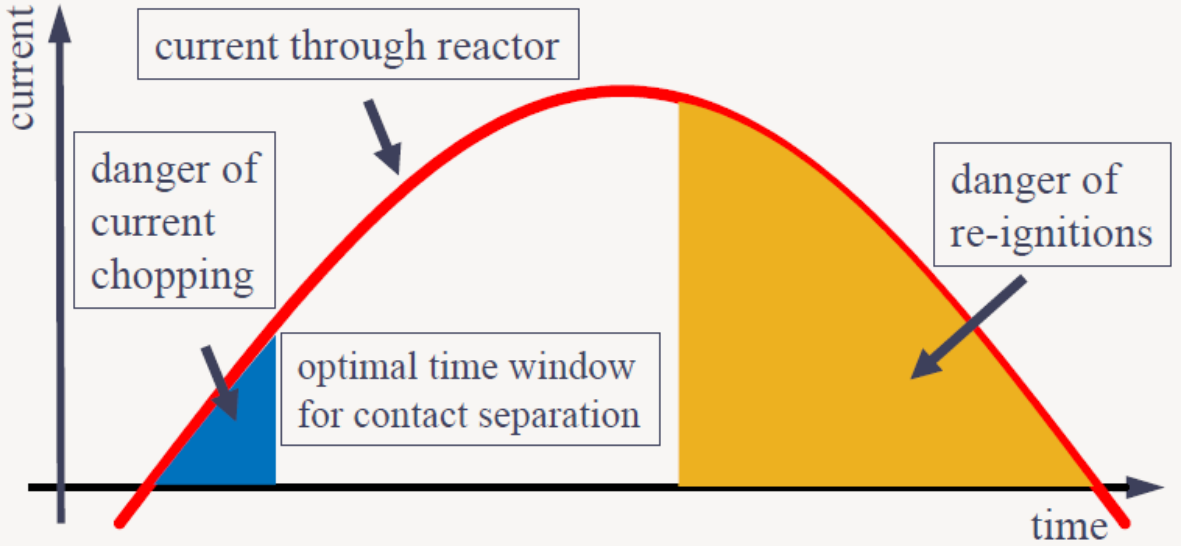
Mit freundlicher Unterstützung von
Wiener Netze und Vorarlberg Netz

Switching Overvoltages Caused by Shunt Reactor Switching and Mitigation Methods (0942 Philipp Hackl)

- Control opening time of breaker
  - Short enough to avoid current chopping
  - Long enough to avoid re-ignition

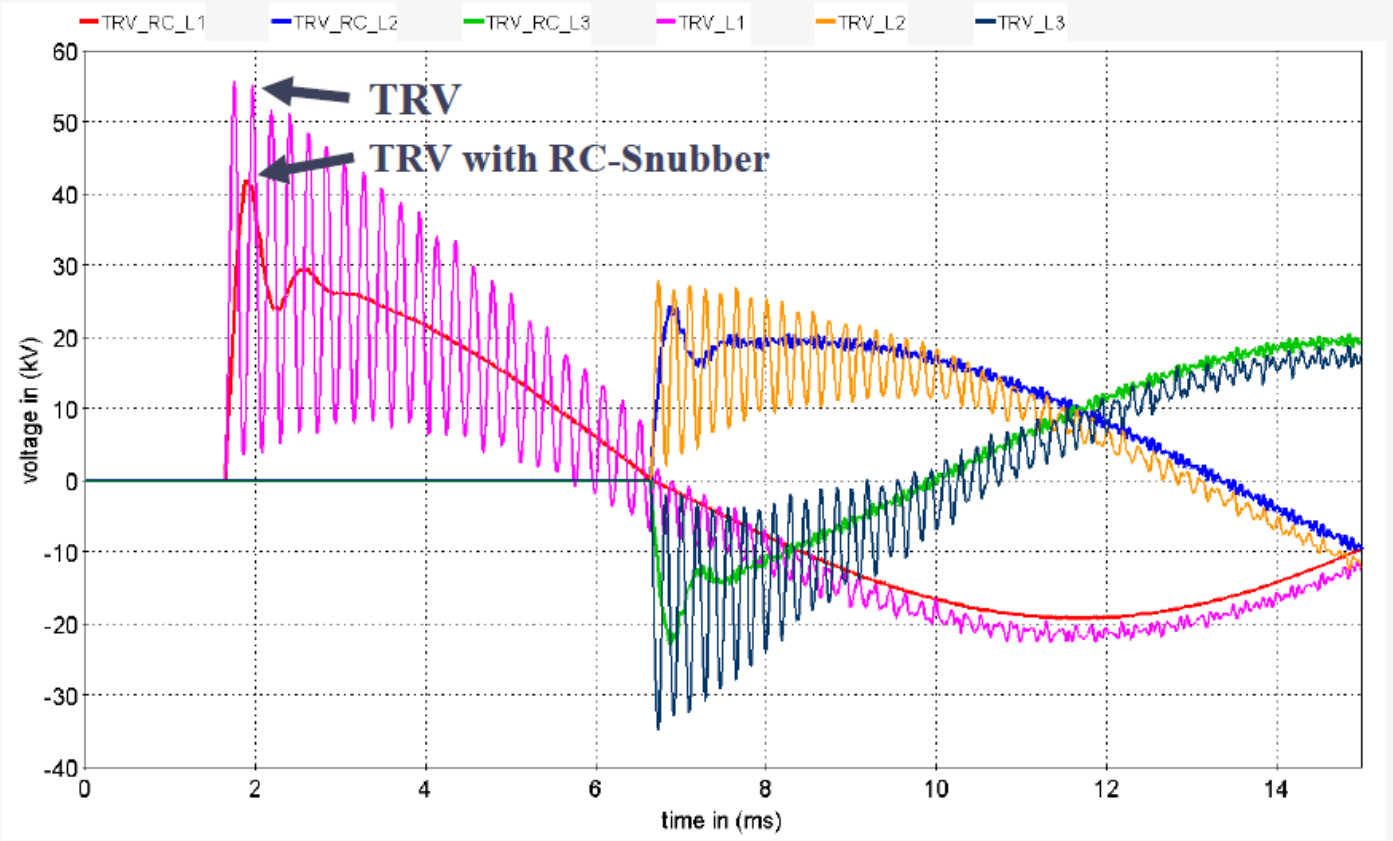
→ Avoid danger contact separation

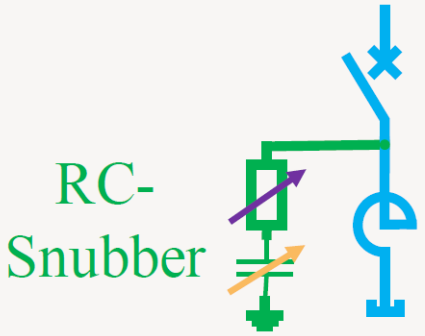
Requirements:
- Breaker poles separately switchable
- „point-on-wave device“ necessary



Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Switching Overvoltages Caused by Shunt Reactor Switching and Mitigation Methods (0942 Philipp Hackl)





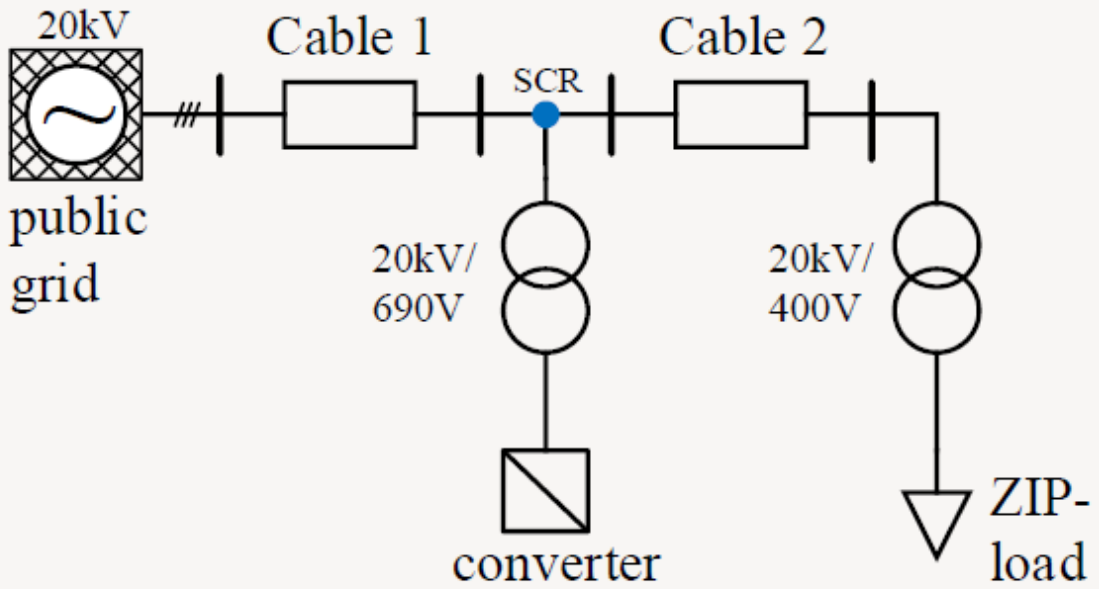
$R_{Snubber}$ = 300 Ω

$C_{Snubber}$ = 250 nF

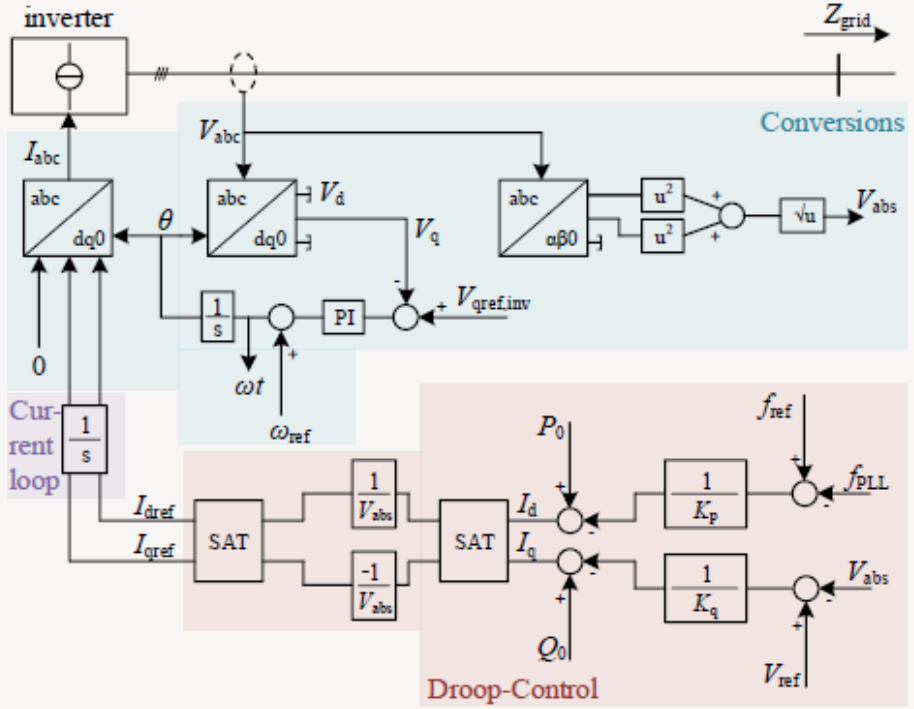
Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Requirements for Grid Supporting Inverter in Relation with Frequency and Voltage Support (0229 Lehmal)

— Weak medium-voltage grid setup



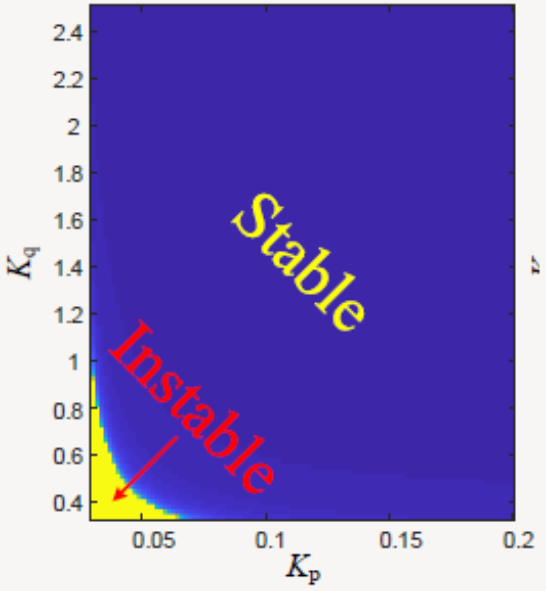
— Grid supporting converter



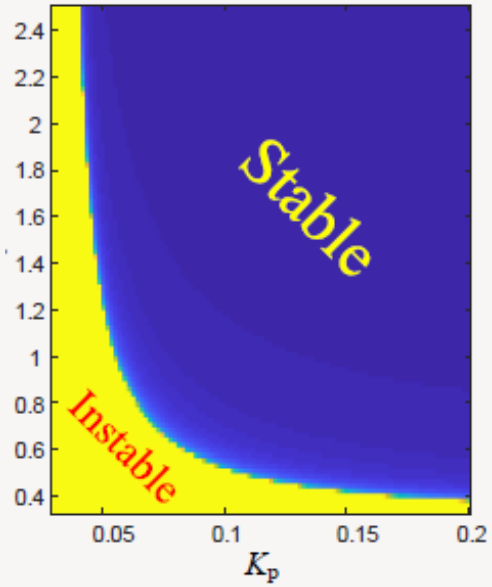
Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Requirements for Grid Supporting Inverter in Relation with Frequency and Voltage Support (0229 Lehmal)

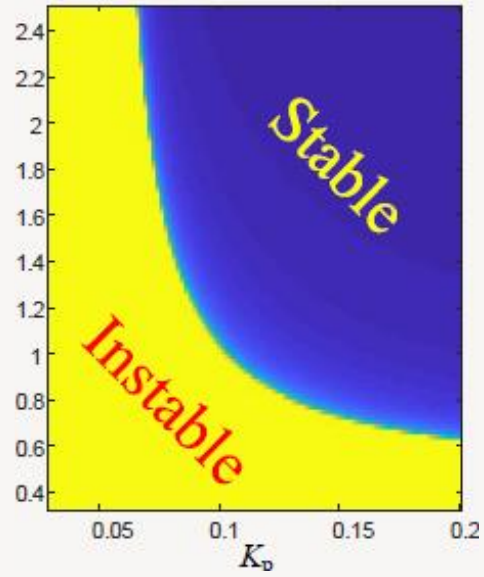
weak grid



constant impedance load



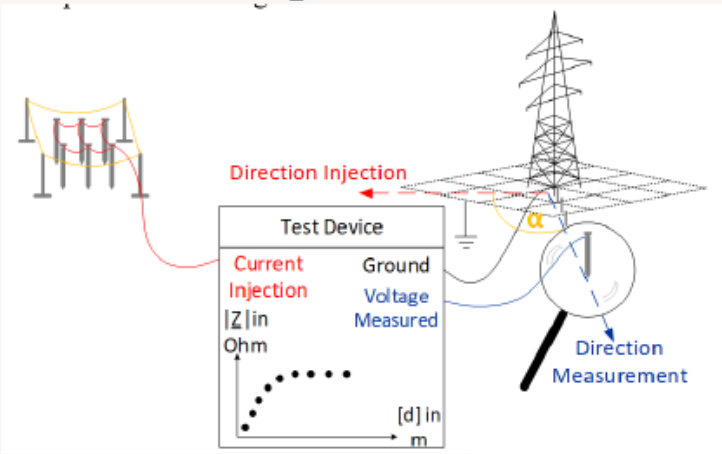
long cable

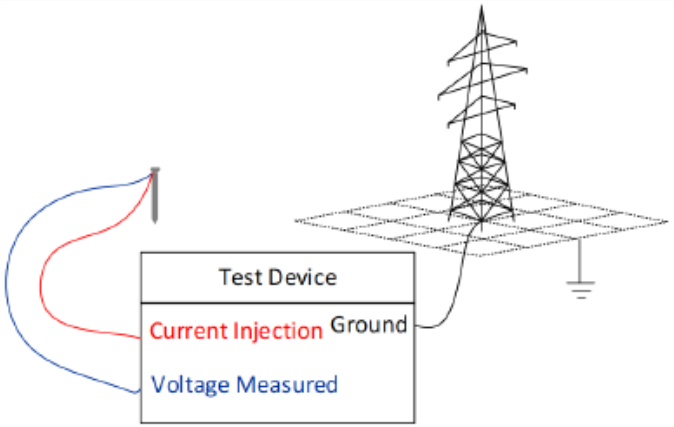


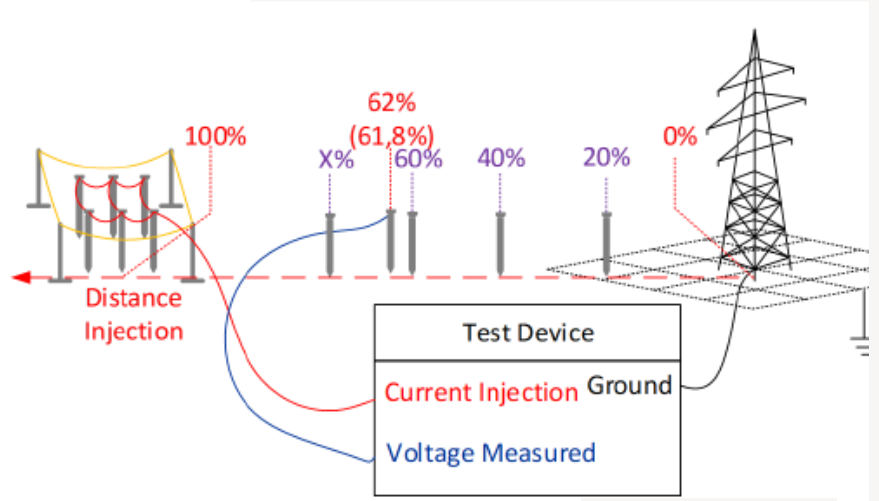
Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Practical Comparison of Earth Impedance Testing Methods (0536 Pikisch)

- Fall of Potential (FoP)
- 62% Method
- Slope Method
- Two Point Method

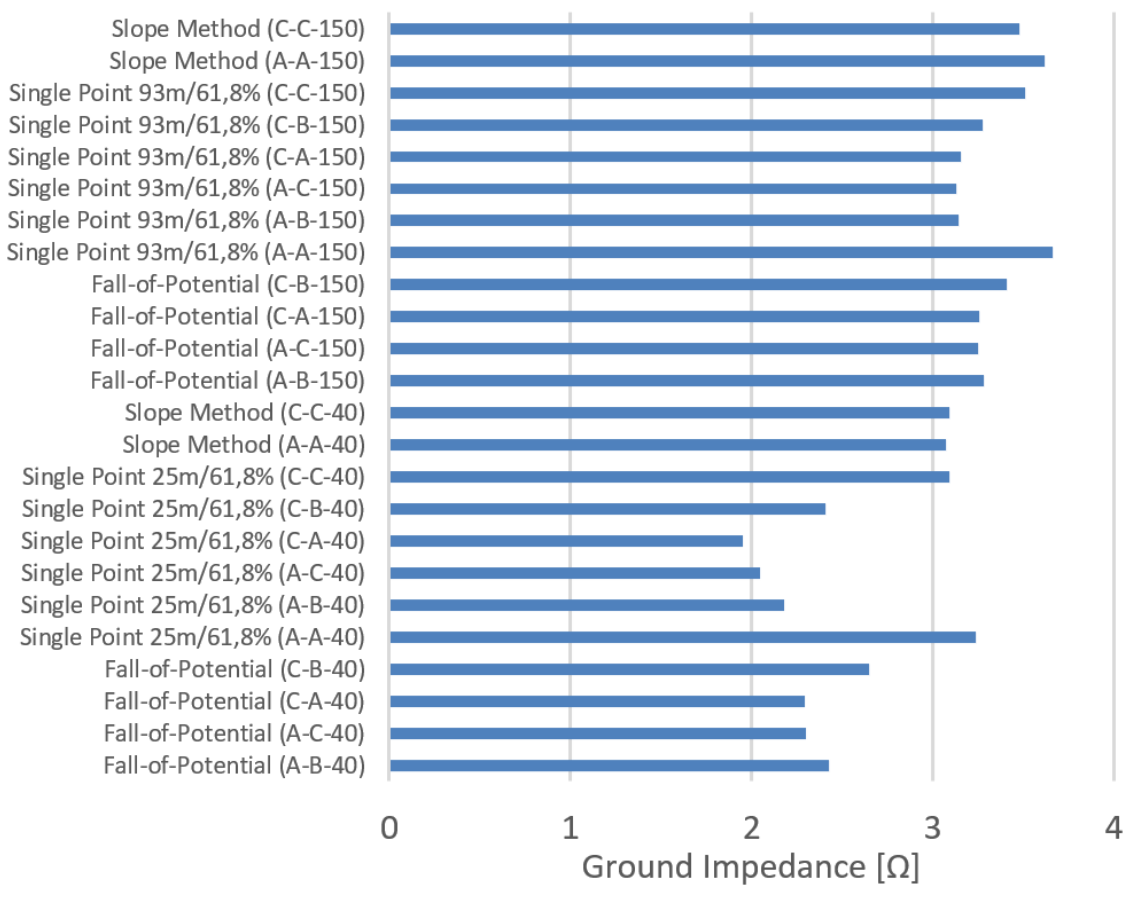






Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Practical Comparison of Earth Impedance Testing Methods (0536 Pikisch)



Mit freundlicher Unterstützung von
Wiener Netze und Vorarlberg Netz

Safety and earthing facing modern technologies (Round table 1)

Why and where do we change neutral grounding?

Where:	20-kV-grids in the middle of Germany (Lower Saxony)
Why:	simplicity of a resistor as a grounding device
	accumulation of cross country faults
	fault detection with high currents
	short fault duration

Ehlert, Christian – RT 1

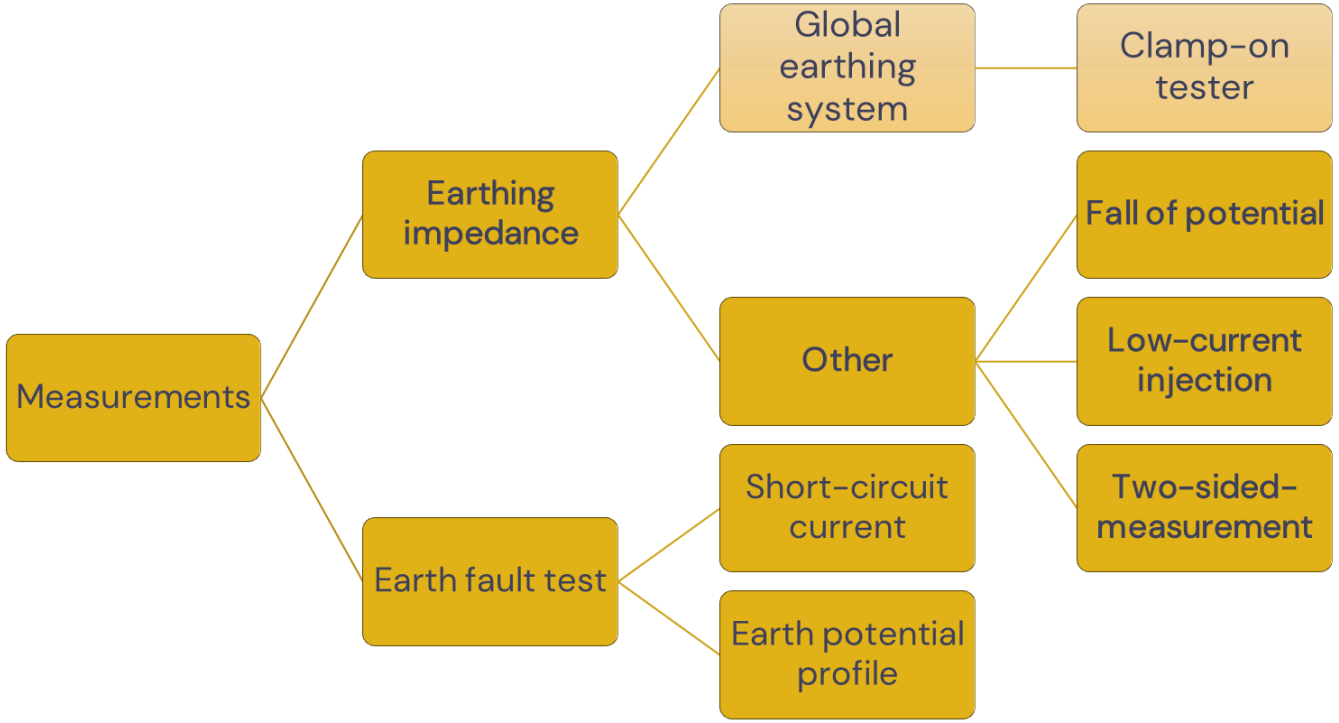
Christian Ehlert

Case Study: The Transition from Compensated to Low Resistance Neutral Grounding

Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Safety and earthing facing modern technologies (Round table 1)

What do we measure?



Ehlert, Christian – RT 1

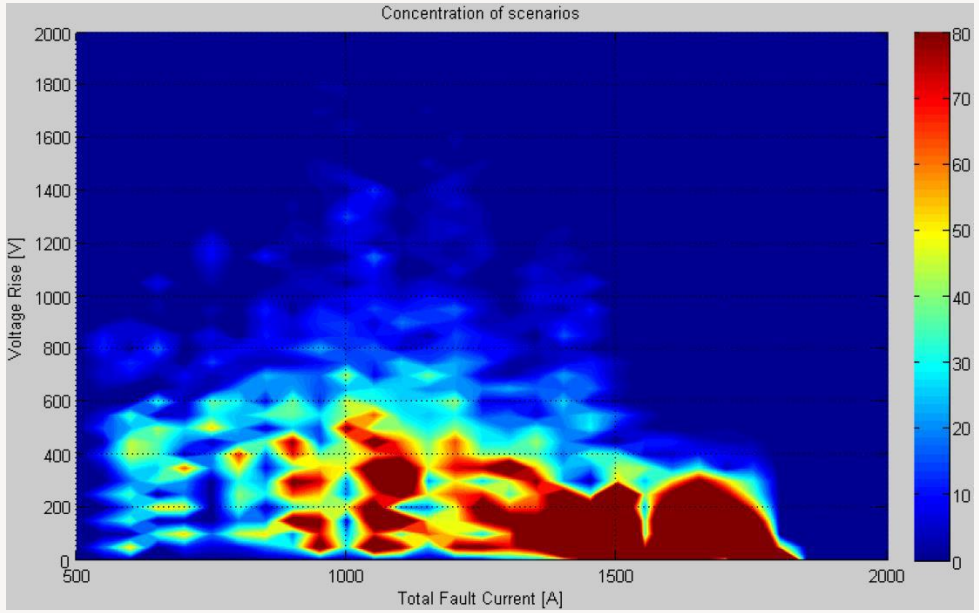
Christian Ehlert

Case Study: The Transition from Compensated to Low Resistance Neutral Grounding

Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Safety and earthing facing modern technologies (Round table 1)

Stochastic simulation



Validation by field tests

Kristof Vliegen

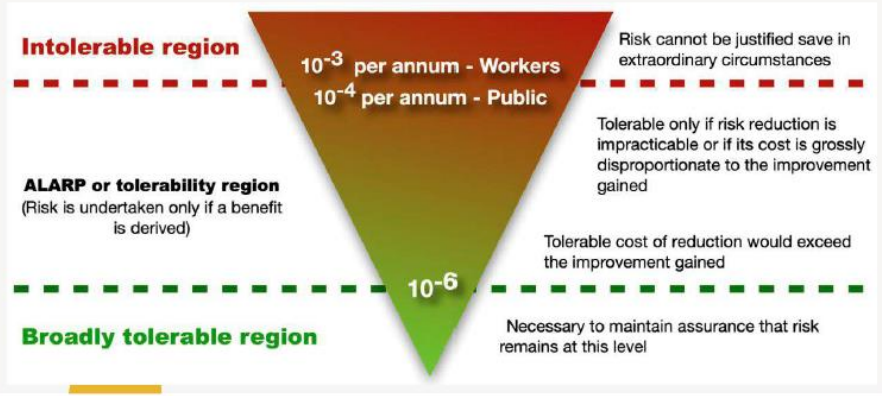
Case study: MV earthing from a Belgian perspective

Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

Safety and earthing facing modern technologies (Round table 1)

We know how, but why do we earth?

- How do we determine where to invest?
- Standard touch voltage/time criteria insufficient
- Fundamental requirement is to manage risk
- Independent decision-making metric and a common language



ROME, ITALY 12-15 JUNE 2023

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Bill Carman

Safety and earthing facing modern technologies

Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

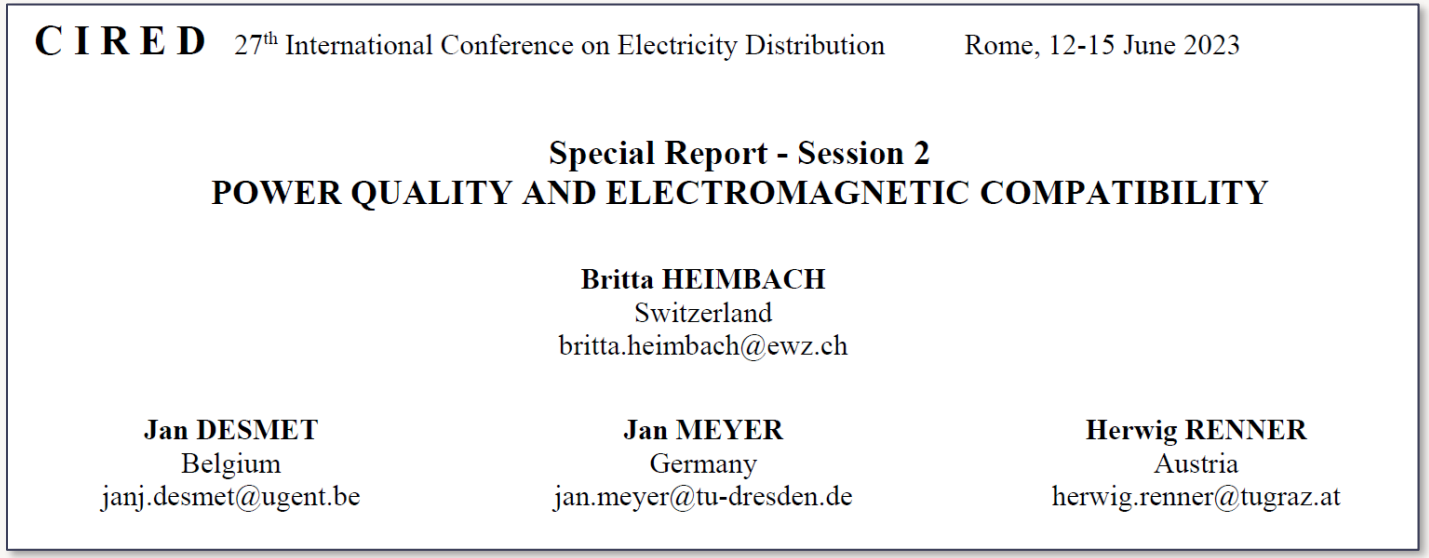
… weitere Themen:

- Oberschwingungen: Dauerthema, besonders Netzimpedanz im Niederspannungsnetz und deren Modellierung
- Elektromobilität: keine OS-Probleme erwartet (equipment approach), wahrscheinlich OS Probleme zu erwarten (system approach)
- Umrichterbasierte Erzeugung: „Grid forming inverter“ gewinnen an Bedeutung, Stabilität (Frequenz, RoCoF) in schwachen Netzen wird langsam ein Thema
- Niederspannungs-DC-Netze: Standardisierung hinsichtlich Spannungsqualität

Mit freundlicher Unterstützung von Wiener Netze und Vorarlberg Netz

… und zum Nachlesen: die Special Reports

https://www.cired2023.org/special-reports/



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Special Report - Session 2
POWER QUALITY AND ELECTROMAGNETIC COMPATIBILITY

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