Thomas Guillod
Curriculum Vitae

1989
Swiss citizen

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Work Experience

08.2020 – 04.2021 **Independent Engineering Consulting**, Zurich, Switzerland,
Magnetic component design, converter optimization, dielectric barrier discharges

11.2018 – 07.2020 **Postdoctoral Researcher**, ETH Zurich, Switzerland, Power Electronic Systems Lab.
Medium-voltage converters, high-frequency magnetics, machine learning

09.2013 – 11.2018 **Research & Teaching Assistant**, ETH Zurich, Switzerland, Power Electronic Systems Lab.
Design and construction of medium voltage DC-DC converters, teaching

04.2014 – 07.2013 **Research Assistant**, ETH Zurich, Switzerland, High Voltage Lab.
Study of high voltage corona discharges with mixed AC/DC voltages

09.2011 – 12.2011 **Internship**, Bombardier Transport, Zürich, Switzerland
Simulation of traction chain of high-speed trains (transformer and converter)

08.2008 – 09.2009 **Teacher Substitute**, CIFOM-ET, Le Locle, Switzerland
Mathematic and physics teaching at a technical high school

Education

09.2013 – 11.2018 **Doctorate**, ETH Zurich, Switzerland, Power Electronic Systems Lab.
Modeling and Design of Medium-Voltage Medium-Frequency Transformers

02.2011 – 03.2013 **Master of Science**, ETH Zurich, Switzerland, Electrical Engineering and Inf. Tech.
Focus on numerical methods, field theory, and high voltage technology
Overall grade point average: 5.8 out of 6.0 (with distinction)

09.2012 – 03.2013 **Master Thesis**, ETH Zurich, Switzerland, High Voltage Lab. (with Swissgrid)
Simulation of AC/DC Hybrids Overhead Lines

09.2007 – 02.2011 **Bachelor of Science**, ETH Zurich, Switzerland, Electrical Engineering and Inf. Tech.
Major: Energy and Power Electronics
Overall grade point average: 5.5 out of 6.0 (very good)

Languages

French	Native speaker
English	Fluent (C1) – Master and Ph.D studies in English, many publications in English
German	Fluent (C1) – Bachelor studies in German, Intensivkurs Deutsch als Fremdsprache

Computer Skills

Skills	Numerical simulations, multi-objective optimization, magnetics, converter design, high-frequency measurements, high-voltage testing, machine learning
Computer	Linux, Windows, Word, Excel, Powerpoint, Illustrator, LaTeX
Scientific tools	COMSOL, Ansys, Altium Designer, Inventor, Simulink, SPICE, PLECS
Programming	Python, Keras, TensorFlow, MATLAB, Qt, C, Java, DSP, Bash

Further Activities

Coding	Open-source software development
Hobbys	History, Ice hockey, Mountaineering

Peer-Reviewed Scientific Journal Papers

[JESTPE 2021] P. Czyz, **T. Guillod**, F. Krismer, J. Huber and J. W. Kolar, "Design and Experimental Analysis of 166 kW Medium-Voltage Medium-Frequency Air-Core Transformer for 1:1-DCX Applications", IEEE J. Emerg. Sel. Topics Power Electron., 2021

[TPEL 2021] P. Papamanolis, **T. Guillod**, F. Krismer, and J. W. Kolar, "Transient Calorimetric Measurement of Ferrite Core Losses up to 50MHz", IEEE Trans. Power Electron., 2021

[OJPEL 2020] P. Papamanolis, **T. Guillod**, F. Krismer, and J. W. Kolar, "Minimum Loss Operation and Optimal Design of High-Frequency Inductors for Defined Core and Litz Wire", IEEE Open Access Journal of Power Electronics, 2020

[OJPEL 2020] **T. Guillod**, P. Papamanolis, and J. W. Kolar, "Artificial Neural Network (ANN) Based Fast and Accurate Inductor Modeling and Design", IEEE Open Access Journal of Power Electronics, 2020

[CPSS 2020] **T. Guillod** and J. W. Kolar, "Medium-Frequency Transformer Scaling Laws: Derivation, Verification, and Critical Analysis", IEEE CPSS Trans. on Power Electron. and App., 2020

[MDPI 2019] R. Färber, **T. Guillod**, F. Krismer, J. W. Kolar, and C. M. Franck, "Endurance of Polymeric Insulation Foil Exposed to DC-Biased Medium-Frequency Rectangular Pulse Voltage Stress", MDPI Energies, 2019

[JESTPE 2019] **T. Guillod**, R. Färber, F. Krismer, C. M. Franck, and J. W. Kolar, "Dielectric Losses in Dry-Type Insulation of Medium-Voltage Power Electronic Converters", IEEE J. Emerg. Sel. Topics Power Electron., 2019

[TPEL 2019] **T. Guillod**, D. Rothmund, and J. W. Kolar, "Active Magnetizing Current Splitting ZVS Modulation of a 7kV/400V DC Transformer", IEEE Trans. Power Electron., 2019

[JESTPE 2019] D. Rothmund, **T. Guillod**, D. Bortis, and J. W. Kolar, "99% Efficient 10kV SiC-Based 7kV/400V DC-Transformer for Future Data Centers", IEEE J. Emerg. Sel. Topics Power Electron., 2019.

[JESTPE 2019] D. Rothmund, **T. Guillod**, D. Bortis, and J. W. Kolar, "99.1% Efficient 10kV SiC-Based Medium Voltage ZVS Bidirectional Single-Phase PFC AC/DC Stage", IEEE J. Emerg. Sel. Topics Power Electron., 2019.

[ELEN 2018] **T. Guillod**, F. Krismer, and J. W. Kolar, "Magnetic Equivalent Circuit of MF Transformers: Modeling and Parameter Uncertainties", Springer / Electrical Engineering, 2018

[ELEN 2017] R. Bosshard, **T. Guillod**, and J. W. Kolar, "Electromagnetic Field Patterns and Energy Flux of Efficiency Optimal Inductive Power Transfer Systems", Springer / Electrical Engineering, 2017

[JESTPE 2017] **T. Guillod**, F. Krismer, and J. W. Kolar, "Protection of MV Converters in the Grid: The Case of MV/LV Solid-State Transformers", IEEE J. Emerg. Sel. Topics Power Electron., 2017

[TPWRD 2014] **T. Guillod**, M. Pfeiffer, and C. M. Franck, "Improved Coupled Ion-Flow Field Calculation Method for AC/DC Hybrid Overhead Power Lines", IEEE Trans. Power Del., 2014

[JPIER 2013] **T. Guillod**, F. Kehl, and C. Hafner, "FEM-based Method for the Simulation of Dielectric Waveguide Grating Biosensors", Progress in Electromagnetics Research, 2013

[TPS 2013] D. Gerber, **T. Guillod**, J. Biela, and R. Leutwyler, "Gate Unit with Improved Short Circuit Detection and Turn-Off Capability for 4.5kV Press-Pack IGBTs Operated at 4kA Pulse Current", IEEE Trans. Plasma Sci., 2013

Awards & Grants

SNSF 2020	Swiss National Science Foundation Mobility Fellowship
IEEE JESTPE 2019	IEEE JESTPE Transactions First Prize Award
IEEE ECCE 2018	Best Paper Award
IEEE ECCE 2016	Travel Grant Award
IEEE IECON 2015	Best Presentation Recognition
IEEE IECON 2015	Travel Grant Award
IEEE ECCE 2014	Best Overall Oral Presentation
IEEE ECCE 2014	Best Overall Student Paper
ETG 2013	ETG-Innovationspreis Finalist (electrosuisse)

Peer-reviewed International Conference Proceedings

[CIPS 2020] M. Kasper, L. Peluso, G. Deboy, G. Knabben, **T. Guillod**, and J. W. Kolar, “Ultra-high Power Density Server Supplies Employing GaN Power Semiconductors and PCB-Integrated Magnetics”, IEEE CIPS, Germany, 2020

[APEC 2020] P. Papamanolis, **T. Guillod**, F. Krismer, and J. W. Kolar, “Transient Calorimetric Measurement of Ferrite Core Losses”, IEEE APEC, USA, 2020

[ECCE Asia 2019] P. Czyz, P. Papamanolis, **T. Guillod**, F. Krismer, and J. W. Kolar, “New 40kV/300kVA Quasi-2-Level Operated 5-Level Flying Capacitor SiC "Super-Switch" IPM”, IEEE ECCE Asia, South Korea, 2018

[ECCE Asia 2018] P. Czyz, **T. Guillod**, F. Krismer, and J. W. Kolar, “Exploration of the Design and Performance Space of a High Frequency 166kW/10kV SiC Solid-State Air-Core Transformer”, IEEE ECCE Asia, Japan, 2018

[COMPEL 2017] **T. Guillod**, J. Huber, F. Krismer, and J. W. Kolar, “Litz Wire Losses: Effects of Twisting Imperfections”, IEEE COMPEL, USA, 2017

[APEC 2017] **T. Guillod**, F. Krismer, and J. W. Kolar, “Electrical Shielding of MV/MF Transformers Subjected to High dv/dt PWM Voltages”, IEEE APEC, USA, 2017

[ECCE USA 2016] **T. Guillod**, R. Färber, F. Krismer, C. M. Franck, and J. W. Kolar, “Computation and Analysis of Dielectric Losses in MV Power Electronic Converter Insulation”, IEEE ECCE, USA, 2016

[IECON 2015] **T. Guillod**, F. Krismer, R. Färber, C. M. Franck, and J. W. Kolar, “Protection of MV/LV Solid-State Transformers in the Distribution Grid”, IEEE IECON, Japan, 2015

[APEC 2015] D. Rothmund, G. Ortiz, **T. Guillod**, and J. W. Kolar, “10kV SiC-Based Isolated DC-DC Converter for Medium-Voltage-Connected SSTs”, IEEE APEC, USA, 2015

[ECCE USA 2014] **T. Guillod**, J. Huber, G. Ortiz, A. De, C. M. Franck, and J. W. Kolar, “Characterization of the Voltage and Electric Field Stresses in Multi-Cell Solid-State Transformers”, IEEE ECCE, USA, 2014

[CIPS 2012] **T. Guillod**, D. Gerber, J. Biela, and A. Müsing, “Design of a PCB Rogowski Coil Based on the PEEC Method”, IEEE CIPS, Germany, 2012

[PPC 2011] D. Gerber, **T. Guillod**, and J. Biela, “IGBT Gate-Drive with PCB Rogowski Coil for Improved Short Circuit Detection and Current Turn-Off Capability”, IEEE PPC, USA, 2011

Open-Source Softwares

since 2019 AI-mag – Inductor design wit artificial neural networks and the finite element method.
MATLAB/Python, https://ai-mag.github.io

since 2019 Toolbox for multi-objective optimization with genetic algorithm
MATLAB, https://github.com/ethz-pes/multi_objective_optimization_matlab

since 2016 Computation of litz wire losses with homogenized parameters
MATLAB, https://github.com/ethz-pes/litz_wire_homogenization_comsol_matlab

since 2016 Toolbox for 2D magnetic simulation with the mirroring method
MATLAB, https://github.com/ethz-pes/mirroring_method_matlab

since 2015 Library for importing and handling 2D and 3D FEM meshes
MATLAB, https://github.com/otvam/fem_mesh_matlab

Further Scientific Contributions

[Talk 2020] P. Czyz,, **T. Guillod**, F. Krismer, and J.W. Kolar, "Experimental Analysis of a 166kW Medium Voltage/Frequency Air Core Transformer for 1:1 DCX Applications", IEEC ECCE, USA, 2020

[Talk 2020] **T. Guillod** and J. W. Kolar, "From Brute Force Grid Search to Artificial Intelligence: Which Algorithms for Magnetics Optimization?", APEC PSMA Industry Session, USA, 2020

[Invention 2020] P. Czyz, P. Papamanolis, V. Lazarevic, **T. Guillod**, F. Krismer, and J.W. Kolar, "Voltage Source Converter Configured to Transition Between at Least Two Voltage Levels", Swedish patent application, 2020

[Workshop 2020] P. Papamanolis, **T. Guillod**, F. Krismer, and J. W. Kolar, "Minimum Loss Operation of High Frequency Inductors", ECPE Magnetic Components Workshop, France, 2020

[Article 2019] D. Rothmund, **T. Guillod**, D. Bortis, and J. W. Kolar, "Use Electrical Energy More Efficiently with New Solid-State Transformers", Swiss National Science Foundation NRP 70/71, 2019

[Talk 2019] **T. Guillod** and J. W. Kolar, "Handling Design Space Diversity of Power Electronics Multi-Objective Optimization", IEEE Design Automation for Power Electronics, Italy, 2019

[Talk 2019] **T. Guillod**, D. Rothmund, and J. W. Kolar, "10kV SiC MOSFETs for Solid-State Transformers: Opportunities and Challenges", X-Power Electronics Conference, China, 2019

[Workshop 2019] **T. Guillod** and J. W. Kolar, "Dielectric Losses in the Insulation of Dry-Type Medium-Frequency Transformers", ECPE Solid-State Transformer Workshop, Switzerland, 2019

[Ph.D 2018] **T. Guillod**, "Modeling and Design of Medium-Frequency Transformers for Future Medium-Voltage Power Electronics Interfaces", Ph.D. Thesis, ETH Zurich, 2018

[Talk 2018] D. Rothmund, **T. Guillod**, D. Bortis, and J. W. Kolar, "Design and Experimental Analysis of a 10kV SiC MOSFET Based 50kHz Soft-Switching Single-Phase 3.8kV AC/400V DC Solid-State Transformer", IEEC ECCE, USA, 2018

[Workshop 2017] **T. Guillod**, F. Krismer, and, J. W. Kolar, "Dielectric Losses: MV/MF Converter Insulation", SCCER FURIES Technical Workshop, Switzerland, 2017

[Talk 2016] **T. Guillod** and J. W. Kolar, "Medium-Frequency Transformers for Smart Grid Applications: Challenges and Opportunities", SCCER-FURIES Annual Conference, Switzerland, 2016

[Poster 2015] **T. Guillod**, R. Färber, C. M. Franck, and J. W. Kolar, "Effects of Mixed-Frequency Voltage Stress on Dry-Type Insulation Systems", SCCER-FURIES Annual Conference, Switzerland, 2015

[Article 2013] M. Pfeiffer, **T. Guillod**, M. Weber, and C. Franck, "Erhöhung der Übertragungskapazität durch Hybride AC/DC-Freileitungen, Potenzial und Machbarkeit in der Schweiz", Bulletin SEV/AES Electrosuisse, 2013

[Poster 2013] **T. Guillod**, "Simulation von AC/DC hybriden Freileitungen", ETG-Innovationspreis, 2013

[Master 2013] **T. Guillod**, "Simulation of AC/DC Hybrid Overhead Lines", Master Thesis, ETH Zurich, 2013

[Talk 2012] F. Kehl and **T. Guillod**, "Combined FEM and Analytical Method for the Simulation and Optimization of Planar Dielectric Waveguide Grating Biosensors", Workshop on Numerical Methods for Optical Nano Structures, Switzerland, 2012