Thomas Guillod / CV

Location: NH, USA
Citizenship: Switzerland
Birth year: 1989

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https://linkedin.com/in/tguillod
https://github.com/otvam

Work Experience

04.2021 - current **Associate Researcher**, Thayer School of Engineering, Dartmouth College, NH, USA

Research group: Prof. Charles R. Sullivan

Modeling techniques for high-performance ferrite materials
Characterization and impact of large-signal dielectric effects in ferrite materials
Free-shape optimization of very high-frequency air-core inductors

07.2020 - 06.2021 **Independent Engineering Consultant**, otvam consulting, Zurich, Switzerland

Magnetic component design and converter optimization
Optimization of power supplies for high-power plasma
Design of high-power air-core transformers and resonant tanks
Management of contracts, intellectual property, and taxes

11.2018 - 07.2020 **Postdoctoral Researcher**, ETH Zurich, Switzerland

Research group: Prof. Johann W. Kolar, Power Electronic Systems Lab.

Establishing a new research direction in machine learning
Development of calorimetric measurement techniques for magnetic materials
Involvement in the co-supervision of two Ph.D. projects

09.2013 - 11.2018 **Research & Teaching Assistant**, ETH Zurich, Switzerland

Research group: Prof. Johann W. Kolar, Power Electronic Systems Lab.

Design of highly efficient medium-voltage / medium-frequency transformers
Completion of the first 99% efficient 10kV SiC-based isolated DC-DC converter
Teaching assistant, student thesis supervision, and lecture coordination

04.2013 - 07.2013 **Research Assistant**, ETH Zurich, Switzerland

Research group: Prof. Christian M. Franck, High Voltage Lab.

Study of high voltage corona discharges with mixed AC/DC voltages

09.2011 - 12.2011 **Intern**, Bombardier Transportation, Zurich, Switzerland

Division: Converter Engineering, Propulsion, and Controls

Development of traction chains of high-speed trains (transformer and converter)

08.2008 - 09.2009 **Teacher Substitute**, CIFOM-ET, Le Locle, Switzerland

Mathematics 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* Advisor: Prof. Johann W. Kolar
09.2012 - 03.2013	**Master Thesis**, ETH Zurich, Switzerland, High Voltage Lab. (with Swissgrid) *Simulation of AC/DC Hybrid Overhead Lines* Advisor: Prof. Christian M. Franck
02.2011 - 03.2013	**Master of Science**, ETH Zurich, Switzerland, Electrical Engineering and Inf. Tech. *Focus area: numerical methods, field theory, and high voltage technology* *Overall grade point average: 5.8 out of 6.0 (with distinction)*
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 PhD studies in English, many publications in English
German	Fluent (C1) - Bachelor studies in German, Intensivkurs Deutsch als Fremdsprache

Skills

Science	Numerical analysis, multi-objective optimization, electromagnetism, converter design, field simulations, high-frequency measurements, high-voltage testing, machine learning
Computer	Linux, Windows, Word, Excel, Powerpoint, Airtable, Illustrator, LaTeX, COMSOL, Ansys EM, Altium, KiCad, Inventor, Simulink, SPICE, PLECS
Programming	Python, MATLAB, C, PyTorch, Pandas, SQL, Qt, DSP, HPC, Bash
Open-source	Development and maintenance of scientific open-source tools

Peer-Reviewed Scientific Journal Papers

[OJPEL 2024] M. Chen, H. Li, S. Wang, **T. Guillod**, et al., “MagNet Challenge for Data-Driven Power Magnetics Modeling”, IEEE Open Access Journal of Power Electronics, 2024

[TPEL 2024] S. Wang, H. Li, D. Serrano, **T. Guillod**, J. Li, C. R. Sullivan, M. Chen, “A Simplified Dc-Bias Injection Method for Characterizing Power Magnetics using a Voltage Mirror Transformer”, IEEE Trans. Power Electron., 2024

[TPEL 2023] D. Serrano, H. Li, S. Wang, **T. Guillod**, M. Luo, V. Bansal, N. K. Jha, Y. Chen, C. R. Sullivan, M. Chen, “Why MagNet: Quantifying the Complexity of Modeling Power Magnetic Material Characteristics”, IEEE Trans. Power Electron., 2023

[TPEL 2023] H. Li, D. Serrano, **T. Guillod**, S. Wang, E. Dogariu, A. Nadler, M. Luo, V. Bansal, N. K. Jha, Y. Chen, C. R. Sullivan, M. Chen, “How MagNet: Machine Learning Framework for Modeling Power Magnetic Material Characteristics”, IEEE Trans. Power Electron., 2023

[JESTPE 2021] **T. Guillod**, P. Czyz, J. W. Kolar, “Geometrical Optimization of Medium-Frequency Air-Core Transformers for DCX Applications”, IEEE J. Emerg. Sel. Topics Power Electron., 2021

[JESTPE 2021] P. Czyz, **T. Guillod**, D. Zhang, F. Krismer, R. Färber, J. Huber, C. M. Franck, J. W. Kolar, “Analysis of the Performance Limits of 166 kW / 7 kV Air-Core and Magnetic-Core Medium-Voltage Medium-Frequency Transformers for 1:1-DCX Applications”, IEEE J. Emerg. Sel. Topics Power Electron., 2021

[MDPI 2021] P. Czyz, P. Papamanolis, F. Trunas Bruguera, **T. Guillod**, F. Krismer, V. Lazarevic, J. Huber, J. W. Kolar, “Load-Independent Voltage Balancing of Multi-Level Flying Capacitor Converters in Quasi-2-Level Operation”, MDPI Electronics, 2021

[JESTPE 2021] P. Czyz, **T. Guillod**, F. Krismer, J. Huber, 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, 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, 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, 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**, 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, 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, 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, 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, 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, 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, J. W. Kolar, “Magnetic Equivalent Circuit of MF Transformers: Modeling and Parameter Uncertainties”, Springer / Electrical Engineering, 2018

[ELEN 2017] R. Bosshard, **T. Guillod**, 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, 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, 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, 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 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

Peer-Reviewed International Conference Proceedings

[APEC 2024] **T. Guillod**, W. V. R. Roberts, C. R. Sullivan, “Characterization and Impact of Large-Signal Dielectric Properties in MnZn Ferrites”, IEEE APEC, USA, 2024

[APEC 2024] E. Deleu, H. Li, J. Li, W. Lee, **T. Guillod**, C. R. Sullivan, S. Wang, M. Chen, “Multi-Material Power Magnetics Modeling with a Modular and Scalable Machine Learning Framework”, IEEE APEC, USA, 2024

[ICEMS 2023] T. Ohno, S. Miric, **T. Guillod**, F. Krismer, J. Huber, J. W. Kolar, “New Triple-Output Quad-Active-Bridge DC/DC Converter Employing a Four-Leg Inverter Input Stage”, IEEE ICEMS, China, 2023

[APEC 2023] **T. Guillod**, J. Lee, H. Li, S. Wang, M. Chen, C. R. Sullivan, “Calculation of Ferrite Core Losses with Arbitrary Waveforms Using the Composite Waveform Hypothesis”, IEEE APEC, USA, 2023

[APEC 2023] H. Li, D. Serrano, S. Wang, **T. Guillod**, M. Luo, M. Chen, “Predicting the B-H Loops of Power Magnetics with Transformer-Based Encoder-Projector-Decoder Neural Network Architecture”, IEEE APEC, USA, 2023

[APEC 2023] S. Wang, D. Serrano, H. Li, A. Lin, **T. Guillod**, M. Luo, C. R. Sullivan, M. Chen, “A Simplified DC-Bias Injection Method with Mirror Transformer for Magnetic Material Characterization”, IEEE APEC, USA, 2023

[COMPEL 2022] D. Serrano, H. Li, **T. Guillod**, S. Wang, M. Luo, C. R. Sullivan, M. Chen, “Neural Network as Datasheet: Modeling B-H Loops of Power Magnetics with Sequence-to-Sequence LSTM Encoder-Decoder Architecture”, IEEE COMPEL, Israel, 2022

[APEC 2022] H. Li, D. Serrano, **T. Guillod**, E. Dogariu, A. B. Nadler, S. Wang, M. Luo, V. Bansal, Y. Chen, C. R. Sullivan, M. Chen, “MagNet: an Open-Source Database for Data-Driven Magnetic Core Loss Modeling”, IEEE APEC, USA, 2022

[CIPS 2020] M. Kasper, L. Peluso, G. Deboy, G. Knabben, **T. Guillod**, 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, 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, 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, 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, J. W. Kolar, “Litz Wire Losses: Effects of Twisting Imperfections”, IEEE COMPEL, USA, 2017

[APEC 2017] **T. Guillod**, F. Krismer, 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, 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, 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**, 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, 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, A. Müsing, “Design of a PCB Rogowski Coil Based on the PEEC Method”, IEEE CIPS, Germany, 2012

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

Further Scientific Publications and Presentations

[Workshop 2024] C. R. Sullivan, **T. Guillod**, “Thermal, Scaling and Dielectric Issues in Magnetics Design”, PSMA Workshop, High Frequency Power Magnetics, USA, 2024

[Talk 2023] **T. Guillod**, “Using (Simple) Neural Networks to boost Power Magnetics Models”, Mag & Mad Conference, Spain, 2023

[Talk 2023] **T. Guillod**, “MagNet Challenge Webinar: Equation-based Baseline Models”, IEEE PELS MagNet Challenge Webinar, 2023

[Workshop 2022] **T. Guillod**, C. R. Sullivan, “Data-Driven Core-Loss Modeling”, ECPE Magnetic Components Workshop, France, 2022

[Workshop 2022] C. R. Sullivan, **T. Guillod**, “Magnetic Core Geometry Influences on Component Performance”, PSMA Workshop, High Frequency Power Magnetics, USA, 2022

[Workshop 2021] **T. Guillod**, J. W. Kolar, “ANN Powered Models for Magnetic Components”, ECPE Online Workshop, Steps towards Design Automation & Artificial Intelligence in Power Electronics, 2021

[Talk 2021] J. W. Kolar, J. Huber, **T. Guillod**, “Fundamentals and Application Oriented Evaluation of Solid State Transformer Concepts”, PSMA Webinar, Roadmap Presentation, 2021

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

[Patent 2020] P. Czyz, P. Papamanolis, V. Lazarevic, **T. Guillod**, F. Krismer, 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, J. W. Kolar, “Minimum Loss Operation of High Frequency Inductors”, ECPE Magnetic Components Workshop, France, 2020

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

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

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

[Talk 2018] D. Rothmund, **T. Guillod**, D. Bortis, 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, J. W. Kolar, “Dielectric Losses: MV/MF Converter Insulation”, SCCER FURIES Technical Workshop, Switzerland, 2017
[Talk 2016]	**T. Guillod**, 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, 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, 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, **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

Awards & Grants

IEEE OJPEL 2023	IEEE OJPEL Transactions First Prize Award (first author)
IEEE TPEL 2023	IEEE TPEL Transactions First Prize Award (co-author)
IUCRC PMIC 2023	Power Management Integration Center / NSF IUCRC / Accepted Project
SNSF PostDoc 2021	Swiss National Science Foundation Mobility Fellowship
IEEE JESTPE 2021	IEEE JESTPE Transactions Second Prize Award (first author)
IEEE JESTPE 2020	IEEE JESTPE Transactions First Prize Award (co-author)
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
Electrosuisse 2013	ETG-Innovationspreis Finalist