

Frederic Trillaud's Resume

Education and experience:

Frederic Trillaud graduated in electrical engineering from the French engineering school, *École Spéciale des Travaux Publics* (ESTP), in 1999. He received a master's degree in 2000 in electrical engineering from the University of Orsay France and his PhD in September 2005 on the “*Study of the thermo-electronic stability of LTS conductors and contribution to the study of the thermoelectric stability of HTS conductors*” from The Grenoble Institute of Technology (Grenoble INP), France. Part of the PhD program, he visited from 2001 to 2003 the National High Magnetic Field Laboratory (NHMFL) in Tallahassee, FL, USA, as a research scholar. From 2005 to 2007, he was appointed postdoctoral associate at the Massachusetts Institute of Technology (MIT) to develop in collaboration with American Superconductor Corporation (AMSC) detection and protection systems for HTS magnets. From 2007 to 2010, he was hired as mechanical engineer at the Ernest Lawrence Berkeley National Laboratory (LBL) working on cryogenic systems, mechanical characterizations of low temperature superconducting cables and wires, development of data acquisition systems and electromagnet design. Since 2011, he has been working with the Institute of Engineering of the National Autonomous University of Mexico to develop superconducting power systems. In 2013, he was appointed lecturer at the graduate school of Engineering and research assistant professor at the Institute of Engineering and recently, in September 2017, early research associate professor and in June 2019, associate professor at the Institute of Engineering.

He is currently teaching at graduate level applied mathematics for Electrical Engineering (numerical methods). Since 2014, he is co-editor of the Latin American Guide on Applied Superconductivity and member of the superconducting magnets in North America and Latin America International Editorial Office of the Superconducting News Forum (SNF). In 2019, he was invited as associate editor of IEEE Transactions on Applied Superconductivity. He is reviewer of international journals, and of the federal Mexican funding agency CONACYT in the area of energy.

The main axis of research covers the multi-physics modeling (electromagnetic, thermal and mechanical) of superconducting and conventional systems with particular accent on power components and scientific instruments. His interest involves the use of open-source numerical tools relying on Finite Element methods and the development of lumped-parameter models. Derived from these interests, he is leading various projects from Mexico related to the development of models for superconducting fault-current limiters, power cables, superconducting static and rotatory machines as well as bulks in collaboration with different national and foreign laboratories and groups.

Academic profile:

Google scholar: <https://scholar.google.com/citations?user=KK0VX34AAAAJ&hl=en>

Publons: <https://publons.com/researcher/1699475/frederic-trillaud/>

Relevant papers in the context of HTS modeling:

1. F. Trillaud, E. Berrospe-Juarez, V. M. R Zermeño, and F. Grilli, "Electromagneto-mechanical model of high temperature superconductor insert magnets in ultra high magnetic fields", *Superconductor Science and Technology*, Vol. 35, No. 5, 054002 (20pp), 2022.
2. F. Trillaud, G. dos Santos, G. Gonçalves Sotelo, "Essential Material Knowledge and Recent Model Developments for REBCO-Coated Conductors in Electric Power Systems", *Materials*, Vol. 14, No. 1892(8), 2021.
3. E. Berrospe-Juarez, F. Trillaud, V. M. R Zermeño, and F. Grilli, "Real-time simulation of large-scale HTS systems: multi-scale and homogeneous models using the $T-A$ formulation", *Superconductor Science and Technology*, Vol. 34, 044002 (20pp), 2021.
4. E. Berrospe-Juarez, F. Trillaud, V. M. R. Zermeño, F. Grilli, H. W. Weijers, and M. D. Bird, "Screening Currents and Hysteresis Losses in the REBCO Insert of the 32 T All-Superconducting

- Magnet Using T - A Homogenous Model ", IEEE Transactions on Applied Superconductivity, Vol. 30, No. 4, 4600705, 2020.
5. E. Berrospe-Juarez, V. M. R Zermeño, F. Trillaud, and F. Grilli, "Real-time simulation of large-scale HTS systems: multi-scale and homogeneous models using the T - A formulation", Superconductor Science and Technology, Vol. 32, 065003, 2019.

List of 5-year publications:

1. C. Calzolaio, S. Sanfilippo, J. M. Schippers, F. Trillaud, "Magnetic Alignment and Mechanical Analysis of Superconducting Bending Section for Proton Therapy", IEEE Transactions on Applied Superconductivity, vol. 32, no. 6, pp. 1-5, Art no. 4400605, 2022. [doi: 10.1109/TASC.2022.3157659]
2. F. Trillaud, E. Berrospe-Juarez, V. M. R Zermeño, and F. Grilli, "Electromagneto-mechanical model of high temperature superconductor insert magnets in ultra high magnetic fields", Superconductor Science and Technology, Vol. 35, No. 5, 054002 (20pp), 2022. [doi: 10.1088/1361-6668/abde87]
3. B. Douine, L. Quéval, F. Trillaud, S. Fawaz, H. Menana;,I. Schwenker, O. Despouys, N. Ivanov, "Characterization of a Superconducting Power Filter for Embedded Electrical Grid Application", IEEE Transactions on Applied Superconductivity, vol. 32, no. 4, pp. 1-4, Art no. 5900604, 2022. [doi: 10.1109/TASC.2022.3152678]
4. M. Díaz-Ojeda, J.R. Rodríguez-Rodríguez, J. Hernández-Sánchez, F. Trillaud, J. C. Olivares-Galván and R. Escarela- Pérez, "Cross phases hybrid transformer for managing and improving the energy quality", International Journal of Electrical Power & Energy Systems, Vol. 131, pp. 107005, 2021. [doi: 10.1016/j.ijepes.2021.107005]
5. F. Trillaud, G. dos Santos, G. Gonçalves Sotelo, "Essential Material Knowledge and Recent Model Developments for REBCO-Coated Conductors in Electric Power Systems", Materials, Vol. 14, No. 1892(8), 2021. [doi: 10.3390/ma14081892]
6. A. Baez-Muñoz, F. Trillaud, J. R. Rodriguez-Rodriguez, L. M. Castro, and R. Escarela-Perez, "Thermoelectromagnetic Lumped-Parameter Model of High Temperature Superconductor Generators for Transient Stability Analysis", IEEE Transactions on Applied Superconductivity, Vol. 31, No. 5, 5201705, 2021. [doi: 10.1109/TASC.2021.3060696]
7. F. Trillaud, B. Douine, L. Quéval, "Superconducting Power Filter for Aircraft Electric DC Grids", IEEE Transactions on Applied Superconductivity, Vol. 31, No. 5, 3700405, 2021. [doi:10.1109/TASC.2021.3060682]
8. E. Berrospe-Juarez, F. Trillaud, V. M. R Zermeño, and F. Grilli, "Real-time simulation of large-scale HTS systems: multi-scale and homogeneous models using the T - A formulation", Superconductor Science and Technology, Vol. 34, 044002 (20pp), 2021. [doi: 10.1088/1361-6668/abde87]
9. D. Guillen, C. Salas, F. Trillaud, L. M. Castro, A. T. Queiroz, G. G. Sotelo, "Impact of Resistive Superconducting Fault Current Limiter and Distributed Generation on Fault Location in Distribution Networks", Electric Power Systems Research, Vol. 186, 106419, 2020. [doi: 10.1016/j.epr.2020.106419]
10. E. Berrospe-Juarez, F. Trillaud, V. M. R. Zermeño, F. Grilli , H. W. Weijers , and M. D. Bird, "Screening Currents and Hysteresis Losses in the REBCO Insert of the 32 T All-Superconducting Magnet Using T - A Homogenous Model ", IEEE Transactions on Applied Superconductivity, Vol. 30, No. 4, 4600705, 2020. [doi: 10.1109/TASC.2020.2969865]
11. D. J. Kolb-Bond, E. Berrospe-Juarez, M. Bird, I. R. Dixon, H. W. Weijers, F. Trillaud, V. M. R. Zermeño, and F. Grilli, "Computing Strains Due to Screening Currents in REBCO Magnets", IEEE Transactions on Applied Superconductivity, Vol. 30, No. 4, 4602805, 2020. [doi: 10.1109/TASC.2020.29793961]

12. M. Gehlot, S. M. Khan, F. Trillaud, and G. Mishra, "Magnetic Field Integral Measurements With Stretched Wire and Hall Probe Methods", IEEE Transactions on Magnetics, Vol. 56, No. 5, 2020. [doi: 10.1109/TMAG.2020.2976031]
13. J. Guo, L. Quéval, B. Roucaries, L. Vido, L. Liu, F. Trillaud, and C. Berriaud, "Nonlinear Current Sheet Model of Electrical Machines", IEEE Transactions on Magnetics, Vol. 56, No. 1, 2020. [doi: 10.1109/TMAG.2019.2950614]
14. E. Berrospe-Juarez, V. M. R. Zermeño, F. Trillaud, and F. Grilli, "Real-time simulation of large-scale HTS systems: multi-scale and homogeneous models using the T - A formulation", Superconductor Science and Technology, Vol. 32, 065003, 2019. [doi:10.1088/1361-6668/ab0d66]
15. J. Kapek, K. Berger, M. R. Koblishka, F. Trillaud, and J. Lévêque, "2-D Numerical Modeling of a Bulk HTS Magnetization Based on H Formulation Coupled With Electrical Circuit", IEEE Transactions on Applied Superconductivity, Vol. 29, No. 5, 6801405, 2019. [doi: 10.1109/TASC.2019.2897331]
16. J. J. Pérez-Chávez, F. Trillaud, L. M. Castro, L. Quéval, A. Polasek, and R. de Andrade Junior, "Generic Model of Three-Phase (RE)BCO Resistive Superconducting Fault Current Limiters for Transient Analysis of Power Systems", IEEE Transactions on Applied Superconductivity, Vol. 29, No. 6, 5601811, 2019. [doi: 10.1109/TASC.2019.2891229]
17. L. M. Castro, D. Guillen, F. Trillaud, "On Short-Circuit Current Calculations Including Superconducting Fault Current Limiters (ScFCLs)", IEEE Transactions On Power Delivery, Vol. 33, No. 5, pp. 2513-2523, 2018. [doi: 10.1109/TPWRD.2018.2800732]
18. E. Berrospe-Juarez, V.M.R. Zermeño, F. Trillaud, F. Grilli, "Iterative multi-scale method for estimation of hysteresis losses and current density in large-scale HTS systems", Superconductor Science and Technology, Vol. 31, No. 9, 095002, 2018. [doi:10.1088/1361-6668/aad224]
19. F. Trillaud, K. Berger, B. Douine, J. Lévêque, "Distribution of Current Density, Temperature, and Mechanical Deformation in YBCO Bulks Under Field-Cooling Magnetization", IEEE Transactions on Applied Superconductivity, Vol. 28, No. 4, 6800805, 2018. [doi: 10.1109/TASC.2018.2801328]
20. B. Douine, K. Berger, F. Trillaud, M. Elbaa, El H. Ailam, "Determination of the Complete Penetration Magnetic Field of a HTS Pellet from the Measurements of the Magnetic Field at its Top-Center Surface", IEEE Transactions on Applied Superconductivity, Vol. 28, No. 4, 880104, 2018. [doi: 10.1109/TASC.2018.2796380]
21. E. Berrospe-Juarez, V.M.R. Zermeño, F. Trillaud, A.V. Gavrilin, F. Grilli, D.V. Abraimov, D.K. Hilton, and H.W. Weijers, "Estimation of Losses in the (RE)BCO Two-coil Insert of the NHMFL 32 T All-superconducting Magnet", IEEE Transactions on Applied Superconductivity, Vol. 28, No. 3, 4602005, 2018. [doi: 10.1109/TASC.2018.2791545]
22. M. Breschi, E. Berrospe-Juarez, P. Dolgosheev, A. González-Parada, P.L. Ribani, F. Trillaud (alphabetical order, corresponding and principal author: F. Trillaud), "Impact of Twisting on Critical Current and n -value of BSCCO and (Re)BCO Tapes for DC Power Cables", IEEE Transactions on Applied Superconductivity, Vol. 27, No. 4, 5401404, 2017. [doi: 10.1109/TASC.2017.2669142]
23. The DAMIC collaboration (F. Trillaud - 34/36, alphabetical order), "First Direct-Detection Constraints on eV-Scale Hidden-Photon Dark Matter with DAMIC at SNOLAB", Physical Review Letters, Vol. 118, Issue 4, 141803, 2017. [doi:10.1103/PhysRevLett.118.141803]
24. G. Mishra, M. Gehlot, G. Sharma and F. Trillaud, "Magnetic design and modelling of a 14 mm-period prototype superconducting undulator ", Journal of Synchrotron Radiation, Vol. 24, No. 2, p. 422-428, 2017. [doi: 10.1107/S1600577517001540]
25. M. Gehlot, G. Mishra, F. Trillaud, G. Sharma, "Magnetic design of a 14 mm period prototype superconducting undulator ", Nuclear Instruments and Methods in Physics Research, Section A, Vol. 846, p. 13-17, 2017. [doi: 10.1016/j.nima.2016.11.070]