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Chapter 1

Introduction

This document is a collection of some of the papers and PhD dissertations published along the years, during SyR-e development. In general, it is possible to access to the papers and dissertations through the IRIS portal at https://iris.polito.it/. The items are sorted in a time order, from the oldest to the newest.



Chapter 2

List of Published Papers

2.1 Journal Papers

- [1] F. Cupertino, G. Pellegrino and C. Gerada, "Design of Synchronous Reluctance Motors With Multiobjective Optimization Algorithms," in *IEEE Transactions on Industry Applications*, vol. 50, no. 6, pp. 3617-3627, Nov.-Dec. 2014. Available here
- [2] G. Pellegrino, F. Cupertino and C. Gerada, "Automatic Design of Synchronous Reluctance Motors Focusing on Barrier Shape Optimization," in *IEEE Transactions on Industry Applications*, vol. 51, no. 2, pp. 1465-1474, March-April 2015. Available here
- [3] C. Lu, S. Ferrari and G. Pellegrino, "Two Design Procedures for PM Synchronous Machines for Electric Powertrains," in *IEEE Transactions on Transportation Electrification*, vol. 3, no. 1, pp. 98-107, March 2017. Available here
- [4] R. Leuzzi, P. Cagnetta, S. Ferrari, P. Pescetto, G. Pellegrino and F. Cupertino, "Transient Overload Characteristic of PM-Assisted Synchronous Reluctance Machines, Including Sensorless Control Feasibility," *IEEE Transaction on Industry Application*, 2019. Available here
- [5] S. Ferrari and G. Pellegrino, "FEAfix: FEA Refinement of Design Equations for Synchronous Reluctance Machines," *IEEE Transaction on Industry Application*, 2020. Available here
- [6] S. Ferrari, P. Ragazzo, G. Dilevrano and G. Pellegrino, "Flux and Loss Map Based Evaluation of the Efficiency Map of Synchronous Machines," *IEEE Trans*action on Industry Application, 2022. Available here
- [7] S. Ferrari, G. Dilevrano, P. Ragazzo, P. Pescetto and G. Pellegrino, "Fast Determination of Transient Short-Circuit Current of PM Synchronous Machines Via Magnetostatic Flux Maps," *IEEE Transaction on Industry Application*, 2023. Available here



2.2 Conference Papers

- [1] G. Pellegrino and F. Cupertino, "FEA-based multi-objective optimization of IPM motor design including rotor losses," 2010 IEEE Energy Conversion Congress and Exposition, Atlanta, GA, 2010, pp. 3659-3666. Available here
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- [3] F. Cupertino, G. M. Pellegrino, E. Armando and C. Gerada, "A SyR and IPM machine design methodology assisted by optimization algorithms," 2012 IEEE Energy Conversion Congress and Exposition (ECCE), Raleigh, NC, 2012, pp. 3686-3691. Available here
- [4] M. Palmieri, M. Perta, F. Cupertino and G. Pellegrino, "High-speed scalability of synchronous reluctance machines considering different lamination materials," *IECON 2014 40th Annual Conference of the IEEE Industrial Electronics Society*, Dallas, TX, 2014, pp. 614-620. Available here
- [5] M. Gamba, G. Pellegrino and F. Cupertino, "Optimal number of rotor parameters for the automatic design of Synchronous Reluctance machines," 2014 International Conference on Electrical Machines (ICEM), Berlin, 2014, pp. 1334-1340. Available here
- [6] M. Palmieri, M. Perta, F. Cupertino and G. Pellegrino, "Effect of the numbers of slots and barriers on the optimal design of synchronous reluctance machines," 2014 International Conference on Optimization of Electrical and Electronic Equipment (OPTIM), Bran, 2014, pp. 260-267. Available here
- [7] C. Lu, S. Ferrari, G. Pellegrino, C. Bianchini and M. Davoli, "Parametric design method for SPM machines including rounded PM shape," 2017 IEEE Energy Conversion Congress and Exposition (ECCE), Cincinnati, OH, 2017, pp. 4309-4315. Available here
- [8] R. Leuzzi, P. Cagnetta, F. Cupertino, S. Ferrari and G. Pellegrino, "Performance assessment of ferrite- and neodymium ssisted synchronous reluctance machines," 2017 IEEE Energy Conversion Congress and Exposition (ECCE), Cincinnati, OH, 2017, pp. 3958-3965. Available here
- [9] M. Gamba, G. Pellegrino, E. Armando and S. Ferrari, "Synchronous reluctance motor with concentrated windings for IE4 efficiency," 2017 IEEE Energy Conversion Congress and Exposition (ECCE), Cincinnati, OH, 2017, pp. 3905-3912. Available here
- [10] S. Ferrari, G. Pellegrino, M. Davoli and C. Bianchini, "Reduction of Torque Ripple in Synchronous Reluctance Machines through Flux Barrier Shift," 2018 XIII International Conference on Electrical Machines (ICEM), Alexandroupoli, 2018, pp. 2290-2296. Available here



- [11] S. Ferrari and G. Pellegrino, "FEA-Augmented Design Equations for Synchronous Reluctance Machines," 2018 IEEE Energy Conversion Congress and Exposition (ECCE), Portland, OR, 2018, pp. 5395-5402. Available here
- [12] S. Ferrari, G. Pellegrino, M. Z. M. Jaffar and I. Husain, "Computationally Efficient Design Procedure for Single-Layer IPM Machines," 2019 IEEE International Electric Machines and Drives Conference (IEMDC), San Diego, CA, 2019. Available here
- [13] S. Ferrari and G. Pellegrino, "Torque Ripple Minimization of PM-assisted Synchronous Reluctance Machines via Asymmetric Rotor Poles," 2019 IEEE Energy Conversion Congress and Exposition (ECCE), Baltimore, MD, 2019. Available here
- [14] P. Ragazzo, S. Ferrari, N. Rivière, M. Popescu and G. Pellegrino, "Efficient Multiphysics Design Workflow of Synchronous Reluctance Motors," 2020 XIV International Conference on Electrical Machines (ICEM), Goteborg, 2020. Available here
- [15] S. Ferrari, P. Ragazzo, G. Dilevrano and G. Pellegrino, "Flux-Map Based FEA Evaluation of Synchronous Machine Efficiency Maps," 2021 IEEE Workshop on Electrical Machine Design, Control and Diagnosis (WEMDCD), Modena (Italy). Available here
- [16] A. Varatharajan, D. Brunelli, S. Ferrari, P. Pescetto and G. Pellegrino, "syreDrive: Automated Sensorless Control Code Generation for Synchronous Reluctance Motor Drives," 2021 IEEE Workshop on Electrical Machine Design, Control and Diagnosis (WEMDCD), Modena (Italy). Available here
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- [18] S. Ferrari, P. Ragazzo, G. Dilevrano and G. Pellegrino, "Determination of the Symmetric Short-Circuit Currents of Synchronous Permanent Magnet Machines Using Magnetostatic Flux Maps," 2021 IEEE Energy Conversion Congress and Exposition (ECCE), Vancouver. Available here
- [19] P. Ragazzo, G. Dilevrano, S. Ferrari and G. Pellegrino, "Design of IPM Synchronous Machines Using Fast-FEA Corrected Design Equations," 2022 XV International Conference on Electrical Machines (ICEM), Valencia, 2022. Available here
- [20] G. Dilevrano, P. Ragazzo, S. Ferrari, G. Pellegrino and T. Burress, "Magnetic, Thermal and Structural Scaling of Synchronous Machines," 2022 IEEE Energy Conversion Congress and Expo (ECCE), Detroit, MI, 2022. Available here
- [21] J. Binder, M. Silvagni, S. Ferrari, B. Deusinger, A. Tonoli and G. Pellegrino, "High-speed IPM Motors with Rotor Sleeve: Structural Design and Performance Evaluation," 2023 IEEE Workshop on Electrical Machine Design, Control and Diagnosis (WEMDCD), Newcastle Upon Tyne, UK, 2023.



- [22] P. Ragazzo, S. Ferrari, G. Dilevrano, L. Beatrici, C. Girardi and G. Pellegrino, "Scaling of Ferrite-assisted Synchronous Reluctance Machines for Lifting Systems," 2023 IEEE Workshop on Electrical Machine Design, Control and Diagnosis (WEMDCD), Newcastle Upon Tyne, UK, 2023.
- [23] A. Bojoi, S. Ferrari, P. Pescetto and G. Pellegrino, "Advanced Circuital Model for e-Drive Simulation, Including Harmonic Effects and Fault Scenarios," 2023 PCIM Europe, Nuremberg, D, 2023.
- [24] P. Ragazzo, S. Ferrari, G. Dilevrano, L. Beatrici, C. Girardi and G. Pellegrino, "Synchronous Reluctance Machines with and without Ferrite Assistance for Lifting Systems," 2023 IEEE International Electric Machines and Drives Conference (IEMDC), San Francisco, CA, 2023.
- [25] G. Dilevrano, P. Ragazzo, S. Ferrari and G. Pellegrino, "Comparative Design of Ferrite- and NdFeB- PMSMs using the (x,b) Design Plane," 2023 IEEE International Electric Machines and Drives Conference (IEMDC), San Francisco, CA, 2023.



Chapter 3

List of Published PhD Thesis

- [1] M. Gamba, "Design of non conventional Synchronous Reluctance machines", Politecnico di Torino, 2017. Available here
- [2] C. Lu, "Design methods for Surface-Mounted Permanent Magnet Synchronous Machines", Politecnico di Torino, 2018. Available here
- [3] S. Ferrari, "Design, Analysis and Testing Procedures for Synchronous Reluctance and Permanent Magnet Machines", Politecnico di Torino, 2020. Available here