Harmonic Brushless Field Excitation Methods for Electrical Machines

Fact Sheet

Project Information

**HARMFIX**
Grant agreement ID: 101108122

**Funded under**
Marie Skłodowska-Curie Actions (MSCA)

**DOI**
10.3030/101108122

**Total cost**
€ 0,00

**EU contribution**
€ 215 534,40

**Start date**
1 November 2023

**End date**
31 October 2025

**Coordinated by**
TAMPEREEN KORKEAKOULUSAATIO SR
Finland

Objective

This project is focused on the design and development of new rotor field excitation methods to achieve brushless operation for wound-field electrical machines (EMs). The proposed method will provide an opportunity to reduce the reliance of EMs on rare-earth materials of which EU is lacking its resources and eliminate the usage of brushes for their rotor field excitation while improving the reliability and cost-efficiency of the machine systems. Through this method, a new armature winding configuration will be developed to generate not only the fundamental magnetomotive force (MMF) but also a suitable harmonic MMF component in the airgap of the EMs, while powered from a single customary current-controlled voltage source inverter (VSI). The rotor of these machines will be altered to house both harmonic and field windings. The harmonic MMF component will be employed to induce a harmonic
current in the harmonic winding of the rotor, which will be rectified to excite the rotor field winding to achieve brushless operation and develop torque. A new topology optimization methodology will be developed to optimize the windings and minimize copper consumption. The EMs employing HARMFIX do not require rare-earth materials, costly auxiliary electromechanical excitation systems or custom-made power electronics circuitry, or control strategies for their brushless operation. Therefore, this method is a truly viable and sustainable alternative for commercial products which are currently employing rare-earth materials, brushless exciters or brushes, and slip rings.

Fields of science

natural sciences > mathematics > pure mathematics > topology

Keywords

Electrical Machines

Programme(s)

HORIZON.1.2 - Marie Skłodowska-Curie Actions (MSCA) - MAIN PROGRAMME

Topic(s)

HORIZON-MSCA-2022-PF-01-01 - MSCA Postdoctoral Fellowships 2022

Call for proposal

HORIZON-MSCA-2022-PF-01

See other projects for this call

Funding Scheme

HORIZON-TMA-MSCA-PF-EF - HORIZON TMA MSCA Postdoctoral Fellowships - European Fellowships
Coordinator

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Region
Manner-Suomi > Länsi-Suomi > Pirkanmaa

Activity type
Higher or Secondary Education Establishments

Links
Contact the organisation  Website  Participation in EU R&I programmes  HORIZON collaboration network

Other funding
€ 0,00

Partners (1)

UNIVERSIDADE DE VIGO
Spain
Net EU contribution
€ 0,00
Address
Campus iagoas marcosende
36310 Vigo

Region
Noroeste > Galicia > Pontevedra

Activity type
Research Organisations

Links
EC signature date: 20 June 2023
Last update: 24 July 2023

Permalink: https://cordis.europa.eu/project/id/101108122

European Union, 2023