

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Given names :

Status (prof., assistant prof., ...):

Laboratory : Website address :

Institution : Website address :

Scientific competence of the supervisor:

Electrical machines, Power electronics, Converter-machine integration, Electrical machine control, Fault diagnosis of PMSMs, Fuel cells, Inverse problems in electromagnetism, Analytical and numerical modeling of electrical engineering systems, Electrical networks, Numerical and experimental simulation (Matlab/Simulink, Dspace, Flux), Electric and fuel cell vehicles, metal hydride hydrogen storage systems, PEM and AEM electrolyzers.

Two major publications in the field proposed for the PhD :

1.
2.

Website address of the personal page :

Supervisor's email :

Description of the research work proposed for a PhD Topic # (see list) :

Title :

Subject :

Driven by the increasing demand for green hydrogen and the rapid development of renewable energies, Anion Exchange Membrane water electrolyzers (AEMWEs) have emerged as a promising technology for cost-effective, flexible, and efficient hydrogen production. Their capability to operate with non-precious catalysts and their dynamic response make them particularly suitable for direct coupling with photovoltaic and wind energy systems.

This PhD thesis aims to develop an optimal modular DC-DC power converter architecture for AEMWE systems supplied by renewable energy sources. The proposed topology will combine high efficiency, high power density, and enhanced reliability while ensuring advanced real-time power flow control under variable operating conditions. The control strategy will consider renewable energy availability, hydrogen production demand, AEMWE operating conditions, efficiency, durability, and safety constraints. Special attention will be devoted to mitigating current and power transients in order to preserve electrolyser lifetime and improve system stability. Finally, the modular converter architecture will enable scalable integration of multi-stack AEMWE systems connected to high-voltage DC buses (1000–1500 V DC) typically used in photovoltaic power plants.

Keywords :

AEM Water Electrolyser (AEMWE), Modular DC-DC Converter, Renewable Energy Integration, Power Electronics, Real-Time Control, Green Hydrogen Production

Expected collaborations :

This work will strengthen and extend the existing collaborations between UTBM and industrial manufacturers involved in the control, sizing, optimization, and monitoring of AEM water electrolyzers (AEMWE) at both French and European levels. The project aims to foster joint research and technological developments through future national and European funding opportunities, particularly within programs such as Horizon Europe and Clean Hydrogen Partnership initiatives.

Background required from the applicant :

The candidate must have strong theoretical and experimental skills in power electronics and drives in order to propose a good architecture of power converter, to develop its control strategy and to build its prototype.

Existence of a PDF file detailing the proposal ("yes" or "no") :

(see guidelines on the website www-csc.utt.fr)