Multi-Physical Dynamic Modeling of Norwegian Giga Battery Factories.

Type of scholarship: NTNU-CSC PhD scholarship

Period of the scholarship: September 2020 to September 2023

Place of Study: NTNU Trondheim

Short description of the scholarship:

The Sustainable Energy System (SES) group at the Department of Energy and Process Engineering at NTNU is currently leading a large research project (2020-2023) to develop more energy-efficient, ethical low-carbon batteries, as well as their fabrication in giga factories. These giga factories are complex dynamic systems combining several energy-intensive processes in a single building. These processes are multi-physical in the sense that they involve large electrical and thermal energy flows (e.g. charging/discharging, drying, strict control of indoor environmental conditions). In addition, the factory should maximize the use of intermittent renewable energy sources, here wind energy, to reduce the environmental impact of the manufactured batteries. The project aims at modeling the energy flows in these buildings using multi-physical dynamic simulation (such as Modelica). The model will be used to support the design and operation of giga factories. The modeling work will start using experience from existing smaller scale battery factories. Several key industrial partners involved the project, such as FREYR and Beyonder, will provide valuable information and expertise regarding existing factories. The insight obtained studying smaller scale factories will be extrapolated to larger scale, in order to analyse the behavior of giga factories.

Qualification and requirement:

- The candidate should hold a Master degree with have a strong background in dynamic analysis of processes, including simulation. Several master programs are therefore relevant, such as process engineering, control or cybernetic engineering, mathematical modeling and computation, and applied mathematics (or equivalent). Therefore, a detailed list of the relevant courses and projects completed by the applicant during his/her education should be provided.
- (Documented) knowledge of a physical-based object-oriented modeling language like Modelica will be considered a strong advantage.

In addition, for all applicants, the following applies:

- Fluent English language, both written and spoken with certificates of TOEFL (minimum 95) or IELTS (minimum 6.5)
• Chinese citizenship documents (copy of his/her passport or national ID of P.R. China)
• CV
• A motivation letter

Deadline for submission of application: 15th of March 2020

Scholarship: 17,000 NOK/month for a period of up to 36 months

According to the NTNU-CSC agreement
CSC will provide a living stipend, currently 12,500 NOK per month for a period of up to forty-eight (48) months, and a round-trip international airfare between China and Norway. NTNU will provide a monthly additional funding for a period of up to forty-eight (48) months, which combined with the CSC living stipend ensures the sufficient income (currently minimum 17,000 NOK per month) required by NTNU. No tuition fees will be charged for PhD candidates at NTNU.

According to the current policy at NTNU, the department will be responsible for the top-up funding from NTNU.

Supervisors info:
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