

Available position for PhD Student

Thesis title

Simulation of Energy Storage Systems in Renewable Energies

A new position for a PhD student is now opened at the Department of Engineering of Universidad Loyola Andalucía under the supervision of Francisco Montero Chacón and Juan F. Carbonell Márquez.

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Requirements

- Bachelors degree (Finished) + Master (Finished or ongoing) [240 + 60 ECTS] *or*
- Bachelors degree (Finished) [300 ETS] *and*
- B2 English Level
- Preferred areas: materials science and engineering, continuum mechanics, structural engineering, mathematics, electrical engineering

Project Description

In this project, we propose the analysis of energy storage systems (ESS) at different scales of observation, namely the material level in order to understand the physical phenomena involved in the storage mechanism (e.g. diffusion), the component level in which materials can be treated as homogeneous media, and finally the system level on which life-cycle tests can be carried out in order to assess their performance. This approach requires the combination of different tools (e.g. discrete models) or even mesoscale modeling tools filling the gap between the discrete and continuum scales (e.g. quasi-continuum methods at finite temperature), in order to understand the aforementioned physical processes. From the continuum scale perspective, we aim at developing advanced coupled thermal-electro-chemo-mechanical finite element models on which perform life-cycle tests, while interacting with lower-scale models via multiscale techniques. This approach is independent of the type of the EES subjected to study (e.g., Li-ion batteries, phase-change materials, thermochemical storage, or sensible storage devices).

Added Value

The student will acquire deep knowledge in several fields: multiscale modeling, resolution of multi-physics problems, combining discrete and continuum tools (e.g. molecular dynamics, finite element method). Moreover, the student will learn and develop skills highly appreciated in R&D departments of engineering companies such as team and collaborative working, advanced programming, independent research, or scientific writing and communication, i.e., scientific papers or oral presentations at international conferences. The student will have the opportunity of making research stays at prestigious institutions. In addition to this, the PhD-candidate will be offered the possibility of starting an academic career teaching some courses in engineering degrees and supervising student projects. This career may be continued at Universidad Loyola Andalucía or another academic institution.