M.Sc. Topic

The importance of energy storage is ever increasing with the increasing urgency to switch to renewable energy sources. Thermochemical energy storage is a promising new technology to handle fluctuations of renewable energy supply. One example is the storage of heat using the reversible chemical reaction: \( CaO + H_2O \rightleftharpoons Ca(OH)_2 \). However, this technology is not yet ready for commercial use; one of many reasons is due to problems still encountered with the operational control.

In order to improve its operational control, numerical simulations are necessary, among other things. Due to the complexity and non-linearity of the system, forecasts of the internal states are either highly error prone or not real-time capable. Machine Learning are therefore necessary to some degree.

The aim of this project is to study the feasibility of applying artificial neural network as an efficient yet accurate emulator to the thermochemical energy storage system. In case of successful application, a further implementation for data assimilation will also be conducted.

Prospective Tasks
- Literature review of thermochemical energy storage and artificial neural network
- Design the artificial neural network (using MATLAB NARX Toolbox)
- Visualize and discuss results
- (Possibility) Implementing artificial neural network for data assimilation

General Information
- Advisors: Timothy Praditia, PD. Dr.-Ing. Sergey Oladyshkin, and Prof. Wolfgang Nowak

Desirable skills
- Knowledge on environmental fluid mechanics (specifically fluid flow in porous media) and statistics
- Affinity to numerical simulations and programming (MATLAB and some basic C++)

Apply now!
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