

Diplomarbeit/Studienarbeit

Topic/Thema: Modeling, Simulation, and Analysis of Hybrid Energy Storage Systems for Wind Energy Conversion System Applications (Modellierung, Simulation und Analyse von hybriden Energiespeichersystemen für Anwendungen in Windenergieumwandlungssystemen)

In a large-scale wind power generation system, active power fluctuation caused by random wind speed will have a serious impact on the grid. In order to limit the power fluctuation that wind farm transmits to the power grid, using energy storage is an effective way.

The different technologies, Battery energy storage systems (BESS), Superconducting magnetic energy storage (SMES), Flywheels, Supercapacitors or energy capacitor systems (ECS), Compressed air energy storage (CAES), and Pumped hydroelectric storage, are available for ESS.

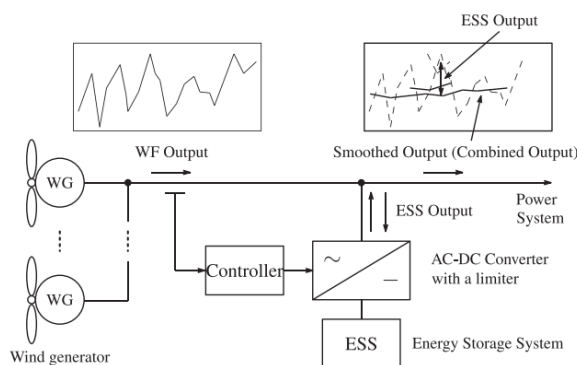


Fig.1. grid-connected WF with ESS

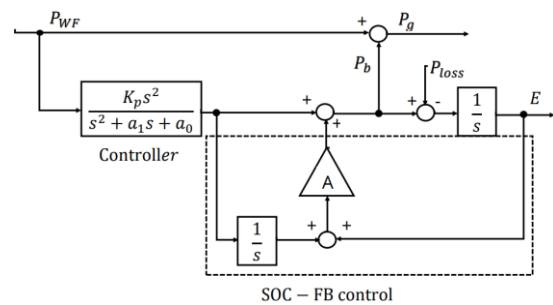


Fig.2. Control scheme of ESS

The purpose of this work is to determine the optimal option for WECS and validate it by simulation results.

Work tasks/Arbeitsaufgaben:

- Literature review on the hybrid energy storage systems for WECS;
- A comparison of energy storage systems and control methods;
- Modeling and simulation of proposed hybrid energy storage systems in Matlab/Simulink;
- Analysis, validation, and development of control scheme for hybrid energy storage systems.