Manipulation of the Local Control of Wind Power Plants - Impact onto Power System Stability

Master- or Bachelorthesis

The transition in power generation to so called smart grids brings with it the increased use of information and communication technology (ICT) at the distribution grid level. One example are so-called remote maintenance accesses through which the protection and control parameters of the wind turbines of a wind power plant can be adapted. An attacker could gain access to these systems through cyberattacks. This poses new challenges for grid operation and manufacturers, especially in the area of IT security, since the manipulation of the parameters of the local control has a direct impact on safe and stable power system operation.

The aim of this thesis is to evaluate the effects of manipulation strategies for the local control of wind power plants on power system stability. For this purpose, manipulation strategies are to be integrated into an existing simulation environment for the dynamic time-domain simulation of power systems. Afterwards stability studies are to be carried out for various scenarios. Subsequently, the criticality of the manipulation strategies will be derived on the basis of technical evaluation criteria (e.g. on the basis of operating limits).

Goals and core tasks of the thesis

- Literature research on cyberattacks on power systems, power system stability, local control of wind power plants
- Implementation of manipulation strategies for wind power plants and evaluation criteria for power system stability
- Further development of dynamic models for the depiction of the local control of wind power plants
- Performance of stability investigations of the energy system using dynamic time-domain simulations

Your profile

- Study of engineering or business engineering (electrical engineering, electrical power engineering, systems & automation)
- Interest in dynamic time-domain simulation
- Knowledge of MATLAB® is an advantage

Contact

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Focus

- Cyberattacks
- Power System stability
- Dynamic time-domain simulation