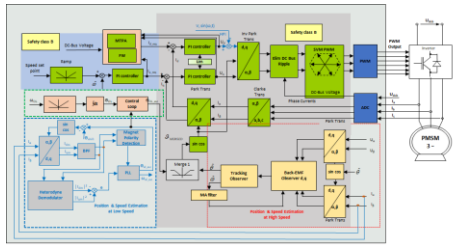
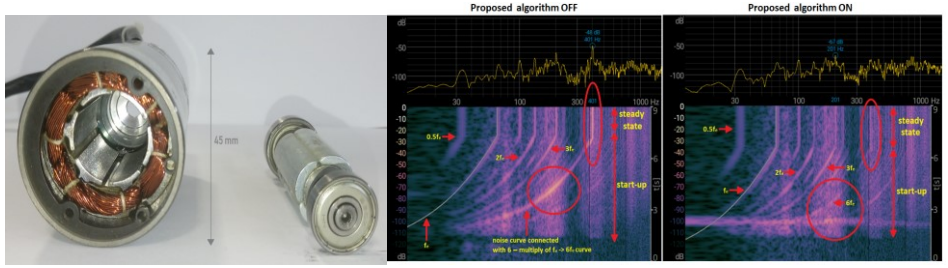
Electric machines and drives group

Development of advanced control strategies and motor control designs

Motor Control strategies



Acustic noise reduction



Sensorless control of SynRM drive

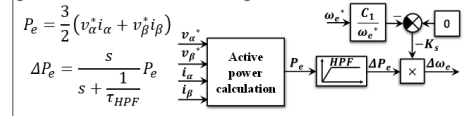
Stabilizing loop

The AC machines without damper winding are specified by unstable operation after a certain frequency exceeds. The stabilizing loop prevents the system to becomes unstable by modifying the required electrical angular velocity ω_e^* with the speed perturbation component $\Delta\omega_e$. The addition of such a component is mandatory to maintain stability.

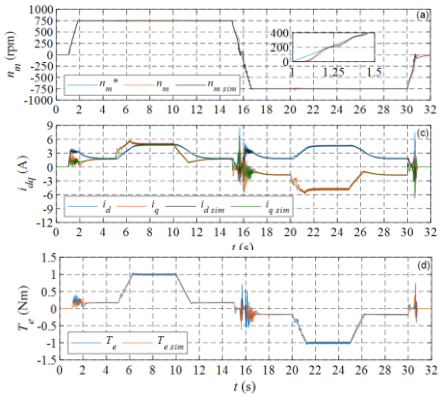
$$P_e = \frac{3}{2}\left(v_\alpha^* i_\alpha + v_\beta^* i_\beta\right)$$

$$\Delta P_e = \frac{s}{s + \frac{1}{\tau_{HPF}}} P_e$$

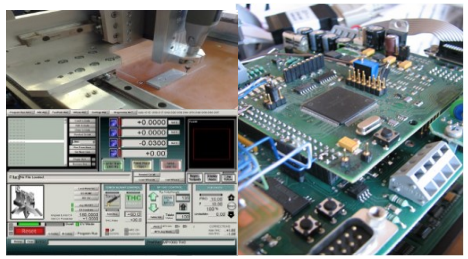
$$\Delta\omega_e = -\frac{C_1}{\omega_e^*}\Delta P_e$$



Stabilizing loop based on active power calculation.

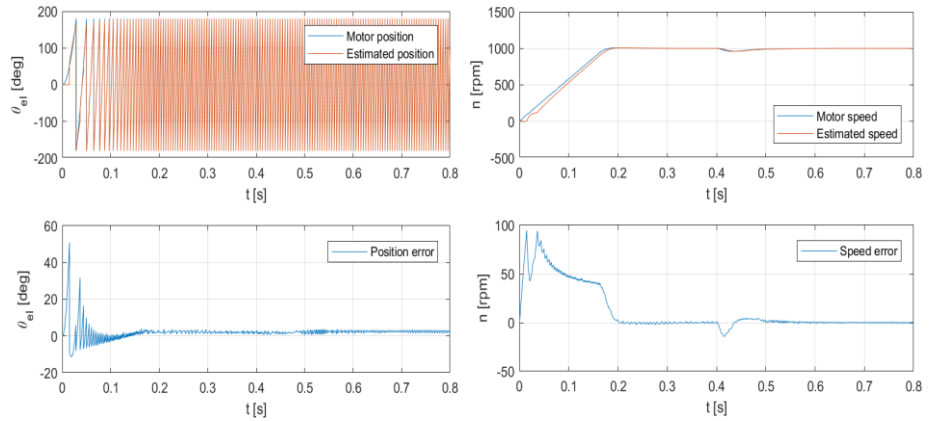


Sensorless algorithms

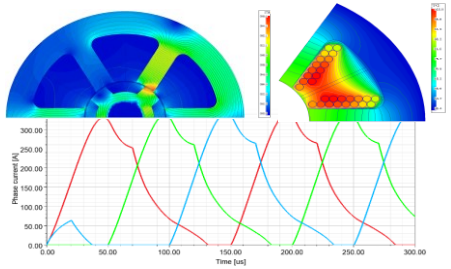


Sensorless testing

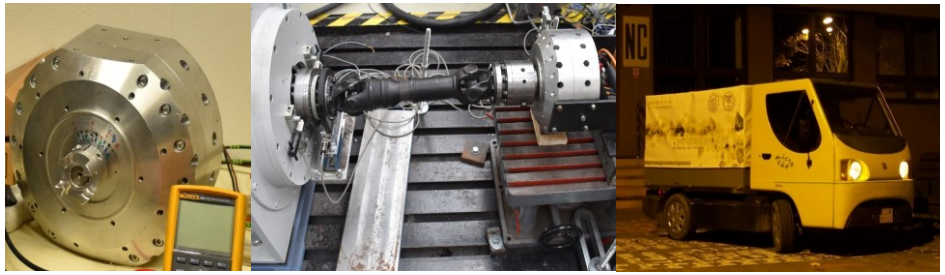
Sensorless control of SRM drive for whole speed range



Machine design



Design of SRM for light urban vehicle



Power systems research group

Statistical modeling of power demand and generation; utilization of renewables for electricity markets and EV charging

Statistical modeling

RES for EV charging

Power quality

Statistical modeling of power demand and generation

The aim is to design a set of algorithms (tools) that will help an electricity market participant (prosumer, household, small enterprise, ...) to achieve profit on the electricity market through active use of renewables, battery storage systems (BESS) and auxiliary services.

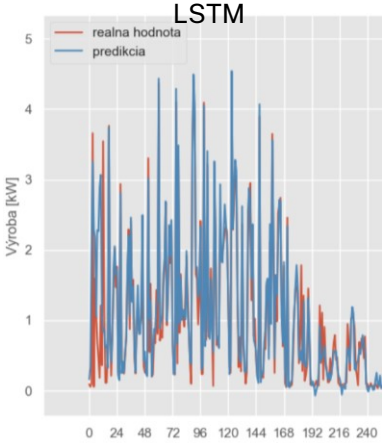
Utilization of local RES and BESS for EV charging

The goal is the design of algorithms enabling the charging of electric vehicles from local energy sources and the grid while minimizing the negative impact on the power grid at the charging station connection point from the allowed/agreed consumption diagram point of view (even by the limited feeding capacity of the grid).

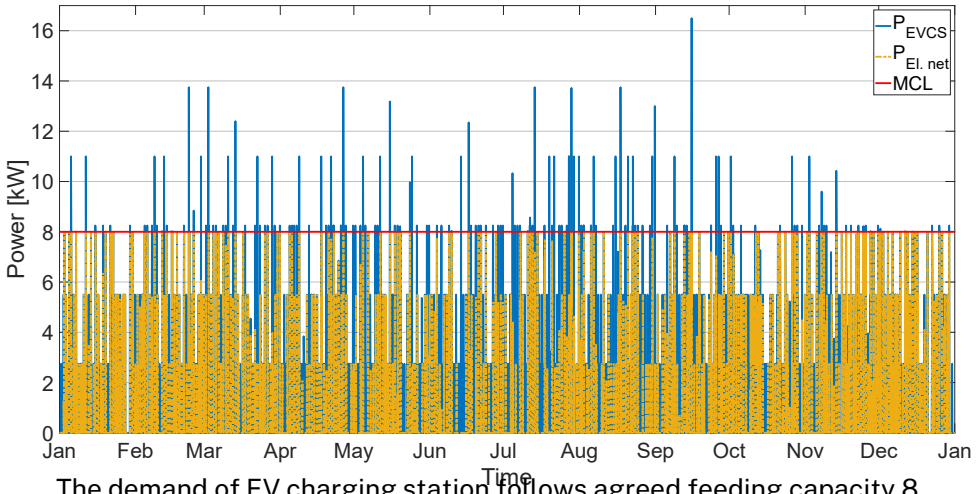
Power quality and corrosion detection

The research team is also engaged in research and expert activities in the field of power quality (measurement and analysis of harmonic components of voltage and current, short-term voltage drops, ...) as well as in the field of basic corrosion detection caused by stray currents.

Generation prediction with LSTM



Power quality measurement



The demand of EV charging station follows agreed feeding capacity 8 kW (MCL)