

Bachelor-Thesis:

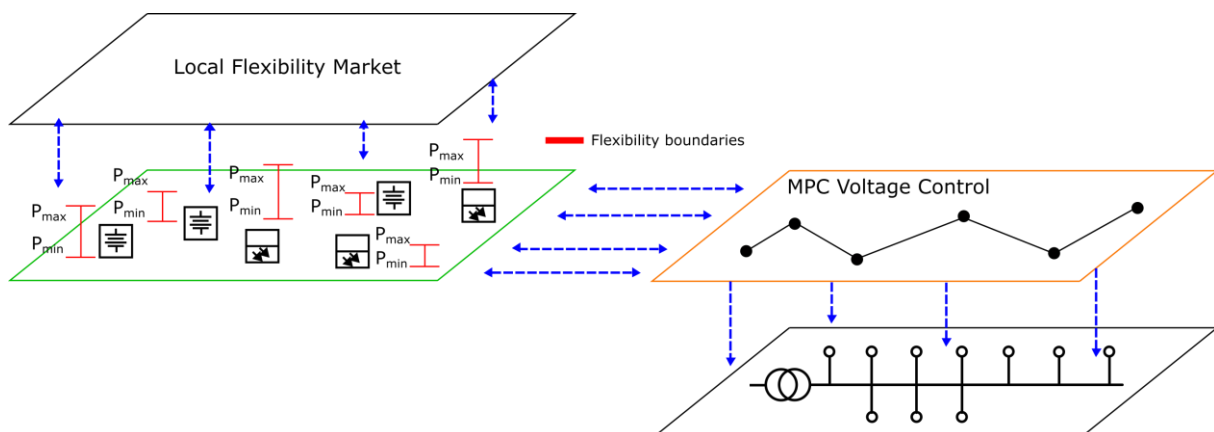
Model Predictive Control for Distribution Grid interfaced with Flexibility Market

Context:

The increasing amount of distributed energy resources in the distribution grid is introducing rapid fluctuations on the voltage, due to the continuous changes in the power generation and in the load. To overcome fast variations in the voltage profile, real-time voltage control strategies have been developed to maintain voltage in the limits in all the nodes of the grid.

In particular, model predictive control (MPC) solutions have been developed to take into account the behavior of the system over a finite prediction horizon. This control method can be used to track external references while compensating for possible deviations introduced by the mismatches between forecast data and real measurements.

Due to its ability of predicting the control set-points, the MPC can be interfaced with an external Flexibility Market to request support to the Distributed Generators (DG)s owned by the customers and that are part of the Market. Thanks to the support of the customers, the MPC can calculate control set-points to solve the voltage issues in distribution grid.



Your tasks:

The student will start with a literature review on MPC for voltage control and the interface with the flexibility market. After that the student will get familiar with the MPC that has been developed in Python in the institute and will work on the interface with the market. After the

implementation, tests with different forecast profiles and different grids will be performed to evaluate the performances of the proposed solution.

On this project, you expect to find:

- Python programming
- Model Predictive Control theory and algorithms
- Distribution grid modelling and simulation
- Docker containers

Requirements:

- Good knowledge of Python programming
- Knowledge of Control Theory (at least Systemtheorie II)

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