

# Abstract

As a result of the steadily growing numbers of wind turbines in the energy supply network, the requirements for testing and certification of those turbines are also growing. The Certification and testing process is not only time but also cost intensive. During this process, models of the wind turbines must be provided, that are used for stability analysis of the supply network.

As of today the validation of these models require outdoor testing of the turbines. In recent years however, test benches with grid emulators have successfully shown their capabilities of taking over these tests. This leads to the point that the validation process of the models should also be based on the test bench measurements. In order to validate with these measurements, a model of the test bench is required, but as of now there are no standards for that.

This thesis presents a way to model the grid emulator at CWD in Aachen as a system-theoretical representation. In order to do so first the required accuracy is extracted from the existing standards of Wind turbines. These include next to error calculations based on the FGW TR4 also direct comparisons of voltages between simulation and measurement. Thereafter, different models of the grid emulator are introduced and compared to these requirements, to figure out the simplest possible model that fulfills them. The results of these comparisons shows, that the grid emulator can be modeled as a reference voltage and an impedance while still accomplishing the needed requirements of the FGW TR4.