

Development of Micro Grid model for Stability Assessment

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Abstract. This paper is qualified for the assessment of cooperation and interaction of micro grids and power system. Primarily it examines the effect of the continuously increasing integration of the intelligent energy distribution networks concerning the stability of the PS. In the paper the model is published, used for simulating the MGs and how to apply them for stability assessment. With the help of a model network the results of the simulations are presented and also the conclusions can be drawn are evaluated. The expectation is that the stability of the PS will increase due to the growing number of the MGs.

Keywords

Micro grid (MG), power system (PS), power balance, stability, time-domain simulation

1. Introduction

The history of development of the PS everywhere proceeded through similar phases: the initially local supply was followed by transfers of shorter distance and finally national interconnected networks came into operation. These networks were connected for the sake of mutual technical help and nowadays the networks are used for great commercial transports as well covering whole Europe. This global PS definitely has many advantages, but nowadays its disadvantages come increasingly into foreground. Because of the high level of loading of system elements, the reliability of supply is decreasing, provided by some recently recorded cases.

Those kinds of network structures are needed to be established, the direction of which are more favorable and designable. They

simplify the system, – from the system regulation's point of view – are able for island operation and in some cases they can join the PS. The MG can be a solution for the above questions. On the other hand for the examination of these kinds of micro networks the creation of a suitable model is essential.

2. Model Development

To develop the model network it was necessary to have a looped system model, which contains the typical elements from the high voltage systems. After developing the network topology we had to model the generators completing the expectations.

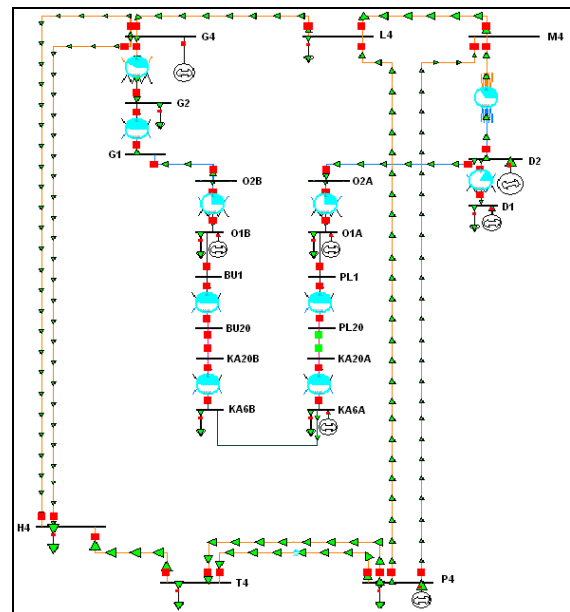
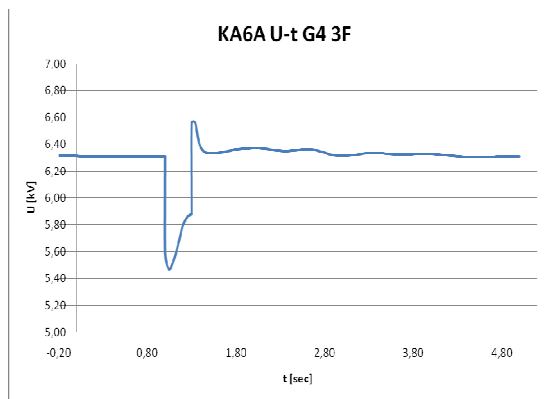


Figure 1.: Topology of the model network

3. Simulations

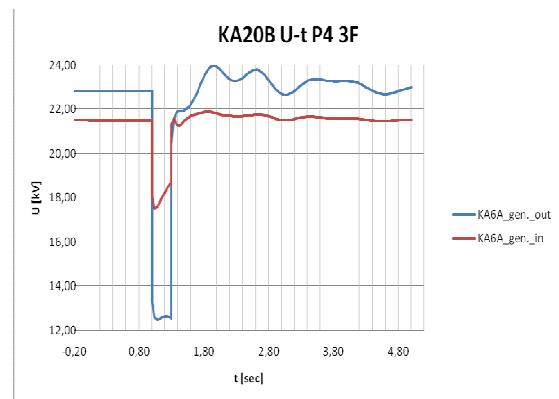
We can separate the analysis into two groups by the aim: first of all we wanted to analyze the networks affect to the micro grid, on the other hand the – hopefully robustness increasing – effect of micro grids to the network.



the KA6A gen. voltage-time chart, the 3ph sc. is on G4 gen.

3.1 Results of the simulations

The simulated fault is as follows: 3 phase sc. on a line close to the bus lasting 0.3 sec., than the faulted line is switched off. The other aspect of the analysis, that the micro grids can increase the robustness of the network. We compared the stability of 120kV and 20kV connected generators with and without the 6.3kV connected generator. It means fault analysis with and without the micro grid.



KA20B voltage-time chart, the 3ph. sc. is on P4 gen. with and without KA6A gen.

4. Conclusion

The goal of our works was to create a model network enabling to simulate micro grids in a conventional high voltage system in a necessary simulator environment. We made a usual system topology, using well known electric parameters. The used simulator is able to analyse system stability. After testing the model a series of measurements were simulated. The results proved the preliminary hypothesis: the micro grids increase the robustness of the high voltage transmission system.

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