A Reduced Order Model for a TOV Study in a Solar PV Farm

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***Abstract*—With more solar photovoltaic (PV) farms coming online around the world, special system studies are needed. One of these studies is Transient Overvoltage (TOV) study. The main purpose of a TOV study is evaluating the capability of the surge arresters selected in the preliminary design of the project. To assess the capability of surge arresters accurately, a detailed electromagnetic transient (EMT) model of the project has to be built. With the detailed EMT model of a large number of inverters included, the run time of the model becomes prohibitive even for a single scenario. In this paper, we propose a method to systematically reduce the order of the EMT model making the model suitable for TOV studies. The reduced order model response is then benchmarked against the response of full order model for various TOV scenarios. Simulations show identical or near to identical responses between the two models. Additionally, the run time of the proposed reduced model is less than the run time of the full order model by a factor of ninety six.**

I. Introduction

This section will introduce the motivation behind the paper, the statement of problem as well as provide some brief literature survey on the problem. The final organization of the paper will be provided here as well in the last paragraph of this section

II. Methodology

This section will provide a quick overview of the method used. It will consists of two parts, the first part how to construct the frequency dependent model as well as how to represent the inverter in the model. This section will basically be a paraphrasing of the transactions paper we used to do our model

A. subsection

This will be about the frequency dependent model

B. another subsection

This is will be the inverter

III. Application

This section will provide a detailed overview on how to apply the methodology in PSCAD^{TM}.

IV. System Model

This section will provide an overview of the model used and its various components (I will make sure we are not including any proprietary information)

V. Scenarios

Depending on the length of section 4, I will either have this section as a stand alone section or a join it with section 4. This section will talk about the various scenarios we did for benchmarking and how the cases were set up in PSCAD.

VI. Results

In this section I will provide the results of the reduced order model and the full order model. Each case will have a graph that shows the voltage at the terminal of the surge arrester in one plot.

VII. Conclusions

This section will provide conclusions and future work.

Appendix A
First appendix

This section will probably contain generic modeling information.