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Research Paper on Automatic Synchronization of Alternator

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Abstract - This paper describes the different configurations of alternators. This unit is designed for parallel connection of alternators. This part is designed to overcome the shortcomings of the traditional methods of synchronization. In this section, the voltage, frequency of the incoming alternator is compared with the reference alternator with the help of Peripheral Interface Controller (PIC). section.

***Key Words*:** Synchronization of Alternator,

1. INTRODUCTION

Generator synchronization is the process of matching parameters such as voltage, frequency, phase angle, phase sequence, and waveform of alternator (generator) or other source with a healthy or running power system. This is done before the generator is reconnected to the power system..

2. AUTOMATIC SYNCHRONISATION UNIT

The auto synchronization process simplifies process authoring by eliminating the synchronization steps. When many process descriptors are created and modified, a manual synchronization step is required to update and propagate the changes. The auto synchronization process eliminates the manual steps When you adopt the auto synchronization process model, then all processes in the method library are automatically synchronized. When you create a new method library, you have the choice to synchronize automatically, but you cannot use both methods. For tailoring processes, a manual synchronization is always required.

When creating descriptors like Task Descriptor, Role Descriptor, or Work Product Descriptor in an auto-synchronized process, a local copy of the attributes and relationships for those descriptors that are inherited from linked method elements are not created. Instead, when the process is being realized, the attributes and relationships from the linked elements are pulled in directly and combined with descriptor-specific data.

You can modify the following properties of descriptors:

Text attributes: Replace

Relationship attributes: Exclude or Include associations that are inherited from the linked method elements

Relationship attributes: Add or Remove the associations you make locally on the descriptors

3 Working:

ASU This unit tests the realization of ideal conditions of synchronization. At the correct instant this unit gives control logic signals to circuit breaker and changeover switches S1 and S2 to select the appropriate configuration of active and reactive power.

The ASU checks the grid voltage and the voltage form the microgrid control output and creates a signal which is sent to switches and breakers to control the operation. I am unsure exactly how this system is implemented and the refference does not specify any detail of the design of the simulink block. I would like some assistance if possible.

4. OBJECTIVES

The main objective of this paper is automatic synchronization of alternator to provide uninterrupted power supply as per load demand. The adjustment of magnitude of voltage, frequency, phase angle and phase sequence of incoming alternator is done automatically. Under emergency condition such as lowering of frequency or synchronizing of large machines a very fast action is needed, which can be provided by automatic synchronization process. A MATLAB SIMULINK is an interactive, graphical

environment for modeling, simulating, and analysing of dynamic systems which overcome the problem of existing tools. The operation of auto synchronization of alternator is illustrated by using MATLAB SIMULINK. The aim of our paper is to create the virtual model for the designing and real time operation for automatic synchronization of alternator with infinite bus bar

5. Model Creation

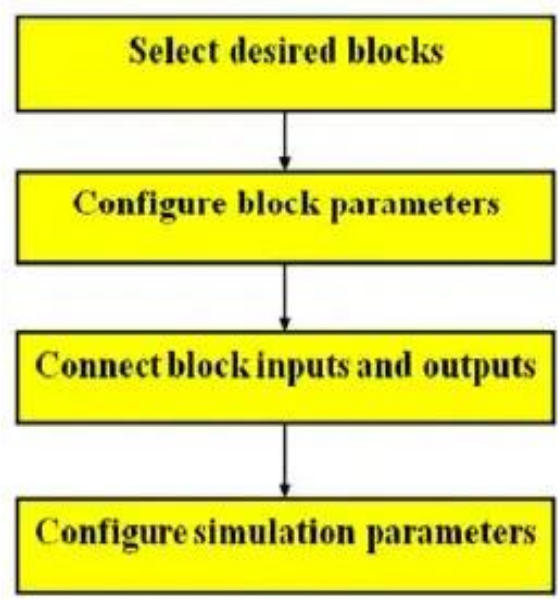
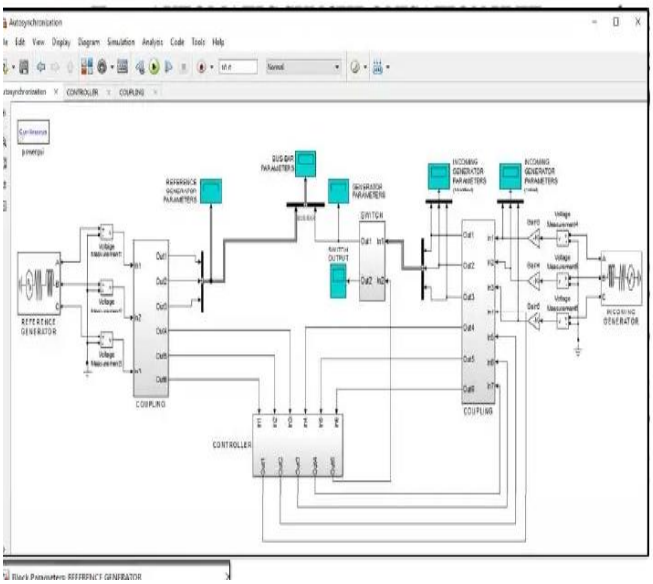


Fig. Flow chart of Model Creation

First you will gather all the necessary blocks from the Library Browser. Then you will modify the blocks so that they correspond to the blocks of the desired model. Lastly, but not the least, you will connect the blocks with lines to form the complete system and set the overall simulation parameters. After this, you willsimulate the complete system to verify that it works.

6. SIMULATION :



The proposed system is simulated according to single line diagram of Fig.2 and consists of a three- phase reference alternator connected to bus bar and another three-phase incoming alternator that should besynchronized and tied with a three-phase infinite busbar. In between, there is a switch that will operate based oncontroller signal. Other peripherals have been used such as a controller to synchronize alternator to grid asshown in Fig.4 along with that coupling-1 and coupling-2 subsystem blocks are used to reduce the complexityof model.Controller subsystem block consist of all control actions which includes comparison between the parameters of reference generator and incoming generator. If the parameters are matched then, controller sendsthe signal to a switch to close, otherwise controller sends the control signal to the incoming generator to adjustits parameters same as that of reference generator.

7. SIMULATION RESULT:

Inputs
:

Reference generator Incoming generator
Line voltage - 440V Line voltage - 500V
Phase angle – 0 P
hase angle – 240
Frequency – 50
Frequency – 10

8. Output Waveforms:

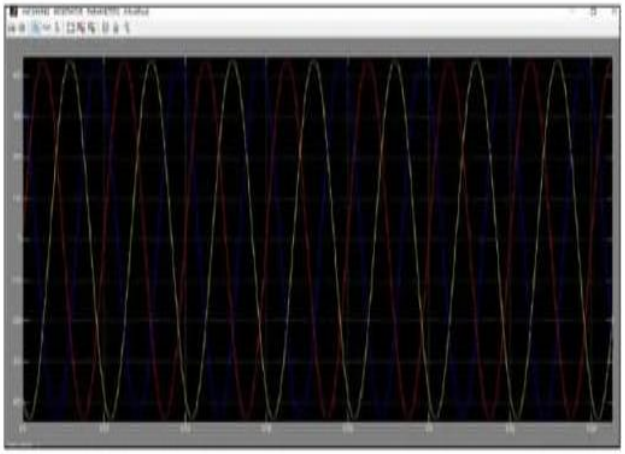


Fig:1. Output waveform of incoming generator

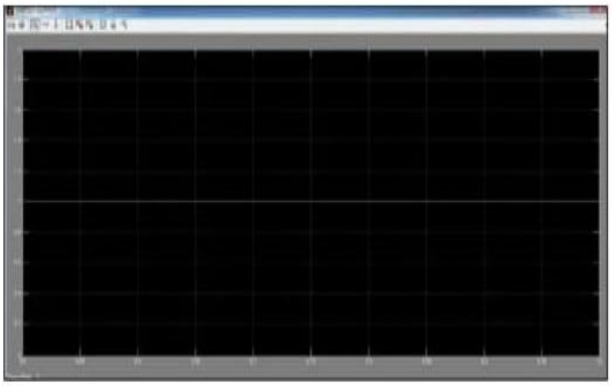


Fig.2 Output waveform of switch

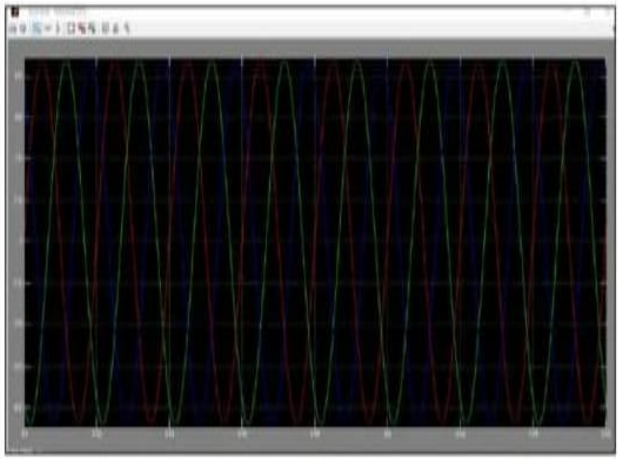


Fig. 3 Output waveform of bus bar
ADVANTAGE:

***9.* ADVANTAGES**

1. Reliability of the whole power system increases.2
2. Simulink model gives visualize results without the need for complicated and time-consuming programming.3
3. Simulink model provides behavior of the system without building it.
4. Precise to be used for monitoring, measuring and parallel operations of the synchronousgenerators.5
5. Because of proper synchronization there are no disturbances such as power oscillations andvoltage deviation.
6. 6*More convenient than conventional method*

9. CONCLUSIONS

The automatic synchronisation of alternator is having several advantages over the manual conventional methods by synchronizing the alternators the capacity of the grid can be increased to meet huge load demand. And also we can improve the whole power scenario. The automatic synchronisation is achieved by using the PIC microcontroller, by automatically adjusting the magnitude of voltage and frequency.

REFERENCES

[1]. B.L. Theraja, A.K. Theraja, a text book of electrical technology.
[2]. Ashfaq Hussain, Dhanpat Rai & Co. (Pvt) Ltd., Electric Machines.
[3]. Dr. P.S.Bimbhra, Khanna Publishers, Power Electronics.
[4]. The 8051 microcontroller & embedded systems, Mazidi & McKinlay.
[5]. Research article by Rohan Ingle, Abhay Halmare "Automatic synchronisation of alternator for small power plants".