

“IMPROVEMENT OF POWER QUALITY USING DIRECT CURRENT CONTROL METHOD BY STATCOM”

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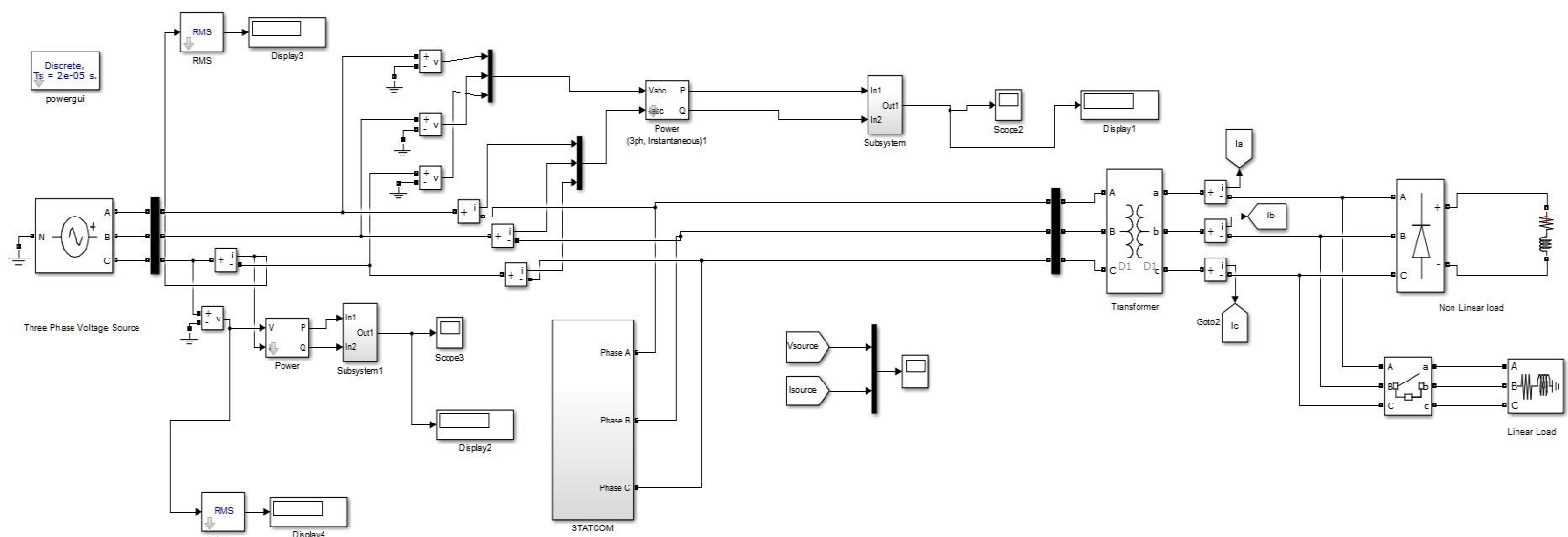
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Abstract: In the proposed system introduced the working principle of STATCOM by using direct current control method of triangle carrier waves to detect both the harmonics and reactive power also reduces the switching noises and pulsating current and improve the reliability, controllability and power factor. With the help of MATLAB to build the model of STATCOM and the simulation result verified the feasibility and effectiveness of this method and accurate, fast and steady compensation effect.

Introduction:

With the rapid development of industry, the requirements of electric power quality are becoming stricter. Improvement in the reliability, controllability and rapidity of modern power system has become a urgent problem to be solved. Reactive power and voltage regulation are the major issues in power system operation. Power quality mainly deals with, Continuity of power supply, Quality of the voltage. Various power quality problems may leads to undesirable problems like voltage variations, harmonics, flickers. So, in order to mitigate this problems, FACTS is used to enhance controllability and increase power transfer capability of the network. So, in order to improve power quality by reducing all such problems STATCOM is used. In this project, we generally focused on STATCOM and it's working in transmission line. This strategy is highly recommended for harmonic elimination and reactive power control also mitigate the switching frequency with the help of triangular carrier waves.

Simulated Designs:



Conclusion and Future scope:

Conclusion:

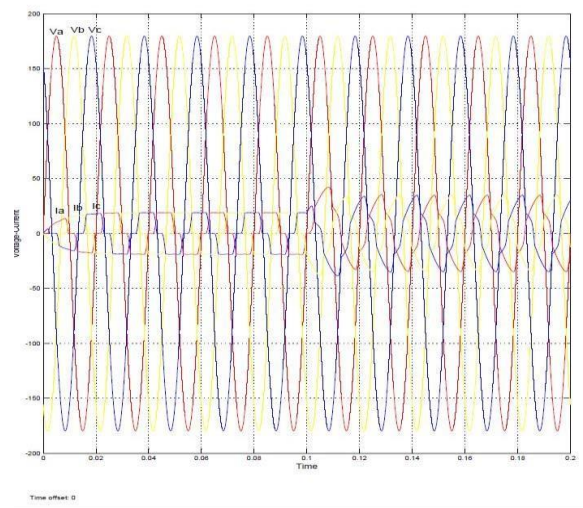
In current system mainly demonstrates the basic operating principle of STATCOM with direct current control scheme under linear and non-linear load conditions. It is observed that this method is complex in implementation as compared to indirect current control method but due to fast response and precise nature of direct current control method, STATCOM acts as a highly proficient device for power factor improvement and harmonic reduction.

Future Scope:

Wind farms interconnected to power system bring new challenges to power system's economic operations. The main conclusion is the wind power impacts most on systems power quality and power imbalances. To meet to minimize this we use STATCOM, which is used to mitigate the effect of power imbalances.

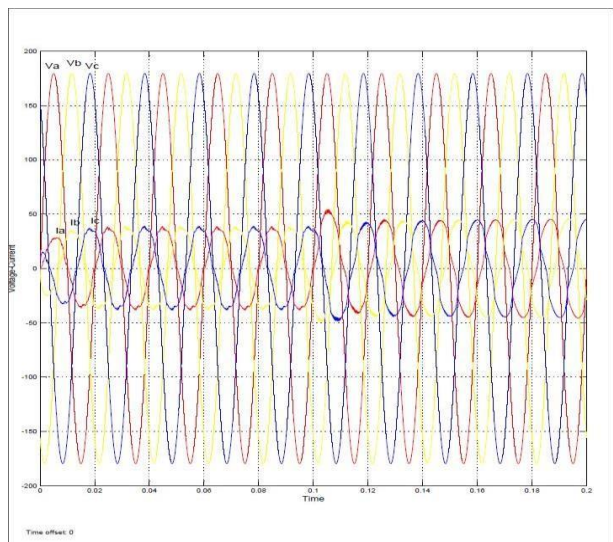
Implementation results:

Simulation result of MATLAB Model

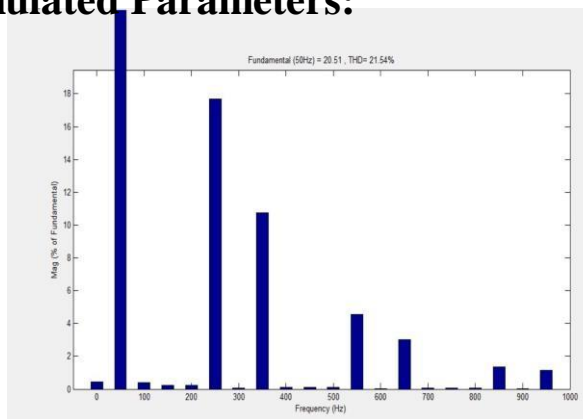


Uncompensated Waveform

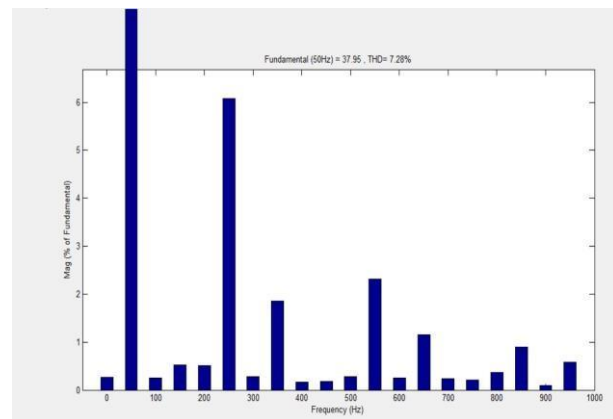
Simulated Parameters:



Compensated Waveform



FFT of Uncompensated



FFT of Compensated

Result :

| FFT ANALYSIS | | | POWER FACTOR | | |
|---------------------|--------|--------|--------------|--------|--------|
| BEFORE COMPENSATION | | | | | |
| A | B | C | A | B | B |
| 21.55% | 21.70% | 21.53% | 0.7871 | 0.6387 | 0.6873 |
| AFTER COMPENSATION | | | | | |
| A | B | C | A | B | C |
| 7.27% | 7.36% | 6.87% | 0.9201 | 0.8517 | 0.8966 |

Calculation :

- Since,

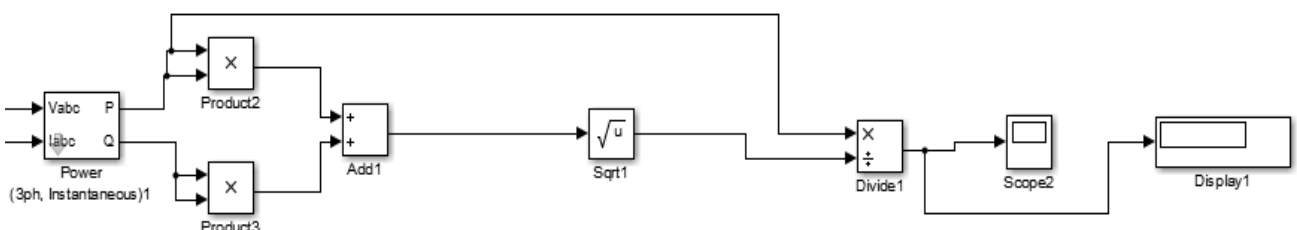
$$\text{Power Factor} = \text{Real Power} / \text{Apparent Power} ;$$
 And,

$$\text{Apparent Power} = \sqrt{(\text{real power})^2 + (\text{reactive power})^2}$$

$$\text{Real Power} = P$$

$$\text{Reactive Power} = Q$$

$$\text{Apparent Power} = \sqrt{P^2 + Q^2}$$



References:

1. Li Shengqing, Li Weizhou, Xu Wenxiang, Zeng Huan Yue, " *The Direct Current Control Method of STATCOM and It's Simulation* " 2013 Third International Conference on Intelligent System Design and Engineering Applications
2. Prashant M. Chavan, Girish R. Walke, " *Using STATCOM Interfacing of Renewable Energy Source to Grid and Power Quality Improvement* " 2015 International Conference on Energy Systems and Applications (ICESA 2015).
3. Mazurov M.I, Nikolaev A.V., Lozinova N.G. " *Improvement of Voltage Quality in AC Network by Use of STATCOM* P.S. Bhimra , Power Electronics.

Program Outcome (PO's)

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
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| Name | | | | | Sign | | | Name & Sign of Guide | | | |
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