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HARMONICS ANALYSIS AND ELIMINATION IN POWER SYSTEM USING MATLAB

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ABSTRACT: A simulation of three-phase harmonic filters used in HVDC (High Voltage Direct Current) systems is presented in this research. By mitigating harmonic voltages and currents, the filters compensate for reactive power. A comprehensive simulation is conducted using a 1000-MW HVDC rectifier system to illustrate the efficacy of several harmonic filters.

I. INTRODUCTION

In order to lessen the distortions brought on by power converters, harmonic filters are essential in HVDC systems. The significance of AC harmonic shunt filters, which supply the reactive power used by the converter in addition to reducing harmonics, is covered in this study.

II. LITERATURE REVIEW

The study expands on previous studies on power systems harmonic mitigation, specifically in HVDC installations. Several filter designs, including C-type high-pass and double-tuned filters, have been studied in the past to solve power quality concerns in large-scale power systems.

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III. SYSTEM DESIGN

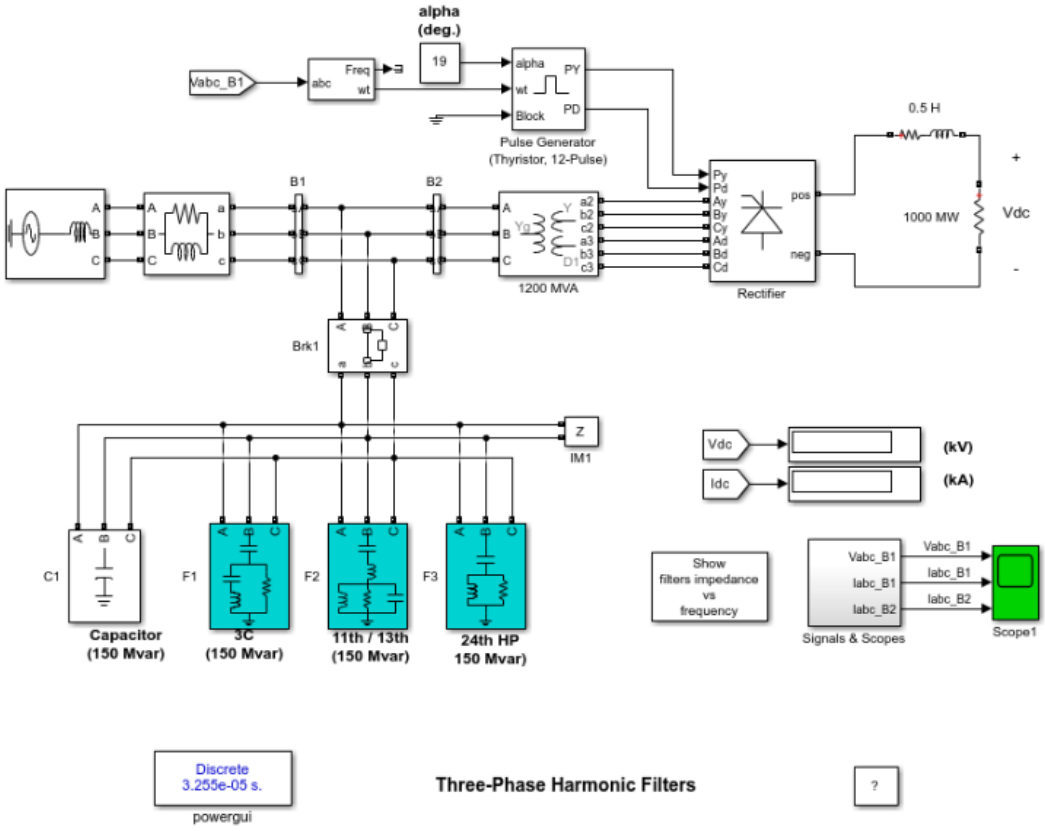

Fig 1. Block Diagram of Simulink

The system includes a 1000-MW HVDC rectifier built from two 6-pulse thyristor bridges, connected to a three-phase transformer. A resistive load and a smoothing reactor are placed on the DC side. The filters designed include a C-type high-pass filter tuned to the 3rd harmonic, a double-tuned filter for the 11/13 harmonics, and a high-pass filter for the 24th harmonic, making up a 600 Mvar filter bank.

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IV. RESULT

The efficiency of the harmonic filters in enhancing power quality is demonstrated by simulations, which indicate that they can successfully lower the Total Harmonic Distortion (THD) from 9% to 0.7%. The intended reactive power characteristics at 60 Hz are confirmed by analysing the filters' impedance-frequency response.

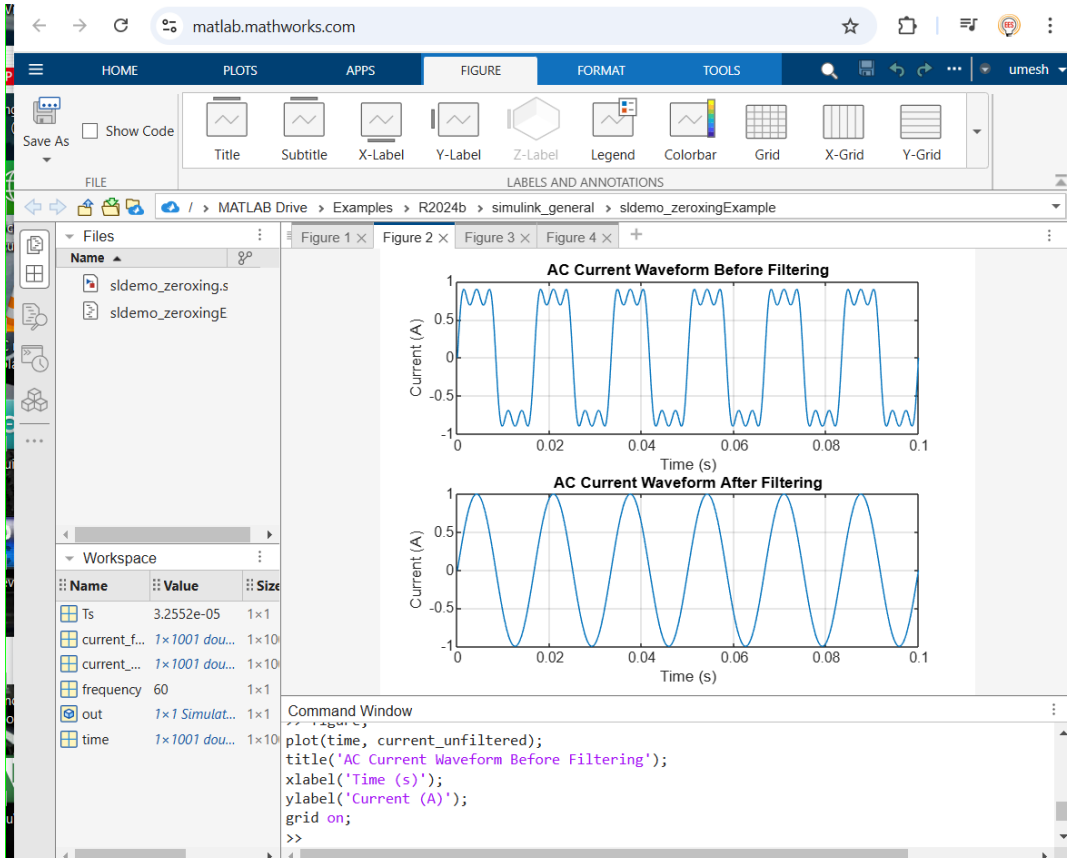

Fig.2 Result

V. CONCLUSIONS

The HVDC converter's harmonics are effectively reduced by the harmonic filters, offering a practical way to increase power system stability and

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