PERFORMANCE OF THREE PHASE TO THREE PHASE INDIRECT MATRIX CONVERTER WITH SVM CONTROL METHOD

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ABSTRACT

Power conversion plays an important role in our world nowadays. Conversions from AC to DC and to AC back are done in order to control AC motor speed and other electrical equipment. The voltage and current are controlled in this conversion but there will be some power losses due to switching in rectifier and inverter. Among the most desirable features in power converter are simple and compact power circuit, generation of load voltage with arbitrary amplitude frequency, regeneration capability, and operation with unity power factor for any load. These ideal characteristics can be fulfilled by matrix converter (MC) which is become increasingly attractive for the AC drive applications. It has the potential to replace the conventionally converter. There are some limitations for this matrix converter and first of all, it has a maximum input-output voltage transfer ratio limited to approximately 87% for sinusoidal input and output waveform. It also requires more semiconductor devices than conventional AC-AC converter since no discrete bi-directional IGBT switches exist. This paper studies about three phase to three phase matrix converter in terms of performance and its technology issues. The simulation are done in MATLAB/Simulink to show that matrix converter is just one of the possible direct AC-AC converter topologies by analyzing the output of phase voltage, line voltage and current along with the harmonic that occurs. Some improvement for this matix converter also has been stated in this paper in order to achieve desired output.

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CHAPTER 1:

INTRODUCTION

A solid AC to AC converter converts an AC waveform to another AC waveform but the output voltage and frequency can be set as desired. There are several type of AC converter which is Indirect AC-AC converters (contained rectifier, DC link and inverter), cycloconverters, hybrid matrix converters and matrix converters (MC). Converters that contained DC links can be categorized into two types; they are Voltage-Source Inverter (VSI) and Current-Source Inverter (CSI).

AC powers are generated at the power plant using rotating electrical machine that called generators. The generators capable to generate three phase AC power at desired frequency and for Malaysia it is 50Hz. This frequency of AC power may vary for every country and it is depends on the speed of the generators. Sometimes, the desired frequency of AC power is different than the generated by the generator; maybe higher or lower than the fixed AC power frequency.

In contemporary world, require for high effectiveness and convenient power converter has been growing continuously in technology[1]. Within the earlier period, revolving converter for example using arrangement of some electrical equipment are use to build electric drives. Fixed converter have also been considered ever since early 20^{th} century, but the amount of applications residue low until the advance of power semiconductors. Present power electronic origin taking place from creation of thyristor, which aims efficient organize of electric drives and systems[3].

Distant from efficient control, power electronic also has previous aim that it want to realize. One of them is the improvement of electric power quality, together with current and voltage buckle, voltage dips and supply voltage interruption. Primary power electronic systems such as diode and thyristor converters included as well thought-out sources of quality trouble because their supply current may enclose high