ABSTRAK

ANALISIS MATRIX CONVERTER SEBAGAI SOLID STATE TRANSFORMER (SST) PADA SISTEM CHARGING BATTERY MENGGUNAKAN KENDALI FUZZY LOGIC

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Kemajuan teknologi diera digitalisasi membuat kebutuhan energi listrik menjadi sangat vital dalam dunia industri. Keandalan pasokan listrik tentunya memiliki tantangan serius terkait terjadinya blackout sistem transmisi akibat gagalnya blackstart pada pembangkit karena supply baterai tidak berfungsi optimal. Guna mengantisipasi kegagalan tersebut dilakukan pemodelan *Matrix Converter (MC)* sebagai *Solid State Transformer (SST)* pengganti trafo konvensional untuk menjaga kestabilan tegangan dan mengubah tegangan sesuai kebutuhan untuk supply baterai. Metodologi SVPWM menggunakan 9 saklar bidirectional pada MC untuk memodulasi lebar pulsa dengan membandingkan duty cicle terhadap gelombang berfrekuensi tinggi. Perbandingan ini dapat menentukan kapan setiap saklar dalam konverter harus open atau close dalam setiap siklus switching. Untuk mengendalikan tegangan stabil dan mengendalikan arus efisien dalam proses charging batterai digunakan *Fuzzy Logic control (FLC).* Dengan *Rectifier* sebagai penyearah (AC-DC) didapatkan hasil tegangan di 127,6 volt DC sehingga proses charging baterai dapat bekerja secara optimal dan stabil.

Kata kunci: Matrix Converter, SVPWM,Charging Baterai, Fuzzy Logic Control.

ABSTRACT

ANALYSIS OF MATRIX CONVERTER AS SOLID STATE TRANSFORMER (SST) IN BATTERY CHARGING SYSTEM USING FUZZY LOGIC CONTROL

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Technological advancements in the digital era have made electrical energy needs vital in the industrial world. The reliability of electricity supply certainly has serious challenges related to transmission system blackouts due to the failure of blackstart at the plant because the battery supply is not functioning optimally. To anticipate this failure, Matrix Converter (MC) modeling is carried out as a Solid State Transformer (SST) to replace conventional transformers to maintain voltage stability and change the voltage according to the needs for battery supply. The SVPWM methodology uses 9 bidirectional switches in the MC to modulate pulse width by comparing the duty cycle against high-frequency waves. This comparison can determine when each switch in the converter should be open or closed in each switching cycle. To control stable voltage and efficient current in the battery charging process, Fuzzy Logic control (FLC) is used. With a Rectifier as the converter (AC-DC), a stable voltage of 127.6 volts DC is obtained, so the battery charging process can work optimally and stably

Keywords: Matrix Converter, SVPWM,Charging Battery, Fuzzy Logic Control.