Optimal Power Factor Correction Effects Based On Energy Conservation System

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LIST OF ABBREVIATIONS

W	Power
p.f	Power Factor
kVA	Apparent Power
kVAR	Reactive power
f	Frequency
DC	Direct Current
AC	Alternate Current
I	Current
V	Voltage
n	Speed
P.Q	Power Quality
C	Capacitance
L	Inductance
R	Resistance
τ	Torque
η	Efficiency
t	Time
N	Winding

LIST OF SYMBOL

W	Power (Watt)
p.f	Power Factor
kVA	Apparent Power (Kilo Volt-ampere)
kVAR	Reactive Power (Kilo-Vars)
f	Frequency (Hertz)
DC	Direct Current(Volt)
AC	Alternate Current (Volt)
I	Current (Amprere)
V	Voltage (Volt)
n	Speed (rpm)
P.Q	Power Quality
C	Capacitance (Farad)
L	Inductnace (Henry)
R	Resistance (ohm)
τ	Torque (N.m)
η	Efficiency (%)
t	Time (Second)
N	Winding (Turns)

Kesan Pembetulan Faktor Kuasa Optimum Berasaskan Sistem Penjimatan Tenaga

ABSTRAK

Dalam tesis ini, aplikasi inverter dan teknik pembetulan faktor kuasa di dalam sistem penjimatan tenaga dibentangkan secara komprehensif. Beberapa kaedah diperkenalkan untuk menindas harmonik ke perintat rendah dan kaedah peningkatan pembetulan faktor kuasa pada sistem dengan keputusan yang diperolehi dibincangkan di dalam tesis ini. Secara umumnya, kaedah reka bentuk penyongsang dan penapisan sistem dibincangkan, dan kajian perbandingan dilakukan berdasarkan kepada tenaga bersih, aspek ekonomi dan keberkesanan. Dengan mereka bentuk teknik-teknik yang perlu dan metodologi, faktor keseluruhan kuasa (PF) dan kesan ganjil harmonic sehingga herotan harmonik ke 7 boleh meningkat kepada jangkaan. Kaedah menggunakan dan diuji pembolehubah penyongsang dan penapisan sistem dilaksanakan dalam kajian ini dan ia telah digunakan untuk menjana tenaga bersih dan kitar semula pada sistem penjimatan tenaga. Dalam kajian ini juga menerangkan aplikasi penyongsang, pembetulan faktor kuasa dan peralatan kawalan harmonik untuk beban pada kuasa kuda yang berbeza (hp) bagi motor induksi. Tesis ini juga menyampaikan teknik yang berkaitan reka bentuk penyongsang jambatan penuh dan pembetulan faktor kuasa litar Sistem Penapisan Hibrid. Pengukuran telah dijalankan untuk mencirikan generasi dan faktor kuasa keperluan harmonik beban. Utiliti elektrik membekalkan kemudahan baru ini memerlukan bahawa motor induksi memenuhi had semasa harmonik dinyatakan oleh standard IEEE 519. Dalam tesis ini, perbandingan antara jenis Inverter, sistem penapisan seperti penapis pasif dan aktif, pembetulan faktor kuasa konvensional (PFC) dan Sistem Penapisan Hibrid telah dibincangkan. Perbandingan yang dilakukan antara inverter itu, sistem penapisan, pembetulan faktor kuasa konvensional (PFC) dan Sistem Penapisan Hibrid untuk membandingkan harmonik purata dari asas bawah sehingga harmonik ke 7, peratusan jumlah harmonic penyelewengan (% THD), kelajuan motor, kerugian dan faktor kuasa. Dari hasil uji kaji yang diperolehi ia telah mendapati bahawa jumlah harmonik penyelewengan akan dikurangkan sehingga 7% dan faktor kuasa akan meningkat kepada 0.97 dengan menggunakan Sistem Penapisan Hibrid.

Optimal Power Factor Correction Effects Based On Energy Conservation System

ABSTRACT

This thesis present an application of inverter and power factor correction technique on energy conservation system were presented comprehensively. Some methods were introduced to suppress low order harmonics and improve the power factor correction on the system and their results obtained were discussed. In general, the method of design inverter and filtering systems were identified, and comparative studies were performed based on their ease of applications, clean energy, economic aspects and effectiveness. By designing the necessary techniques and methodology, the overall power factor (PF) and the odd harmonic effects until 7^{th} harmonic distortion were improved in accordance to the expected result. Method of utilizing and testing the variable for inverter and filtering system were performed in this study and was applied to generate clean and recycling energy on the energy conservation system. This thesis present results of the applications of inverter, power factor correction and harmonic control equipment for loads on a different horsepower (hp) of induction motor. This thesis also presented the related techniques of designed full bridge inverter and Hybrid Filtering System. Computation was conducted to characterize the harmonic generated and power factor requirements of the load. The electric utility supplying the new facility required that the induction motor meet the harmonic current limits specified by the IEEE 519 standard. This thesis present the comparisons between the different types of inverter, filtering system such as passive and active filter, conventional power factor correction (PFC) and Hybrid Filtering System were discussed. the comparison is performed between the inverter, filtering system, conventional power factor correction and Hybrid Filtering System to compare the average harmonic from fundamental until 7^{th} harmonic, percentage of total harmonic distortion (%THD), speed of motor, losses and power factor. From the experimental result obtained it was found that total harmonic distortion will be reduced by 7% and the power factor will be increased to 0.97 by using the Hybrid Filtering System.