الاية

بِسۡمِ ٱللَّهِ ٱلرَّحۡمَٰنِ ٱلرَّحِيمِ

((فَتَعالَى اللَّهُ الْمَلِكُ الْحَقُّ وَلا تَعْجَلْ بِالْقُرْآنِ مِنْ قَبْلِ أَنْ يُقْضى إِلَيْكَ وَحْيُهُ وَقُلْ رَبِّ زِدْنِي عِلْماً))

طه (114)

صدق الله العظيم

DEDICATION

To our parents, and anyone who lived his whole life as an unknown engineer.

ACKNOWLEGEMENT

First of all and always we thank our God “Allah” to make me live these moments. We are very grateful to my dear supervisor Dr.Gidani Osman Adlan, and we would like to think him indeed for his supervision and encouragement.

ABSTRACT

Field-Oriented Control (FOC), allows high performance of the induction motor drive by using vector control to overcome the coupling effect and inferior dynamic response of scalar control. The basic idea of the vector control is to decompose a stator current into a magnetic field-generating component (ids) and a torque generating component (iqs) and both components can be separately controlled to make the performance of the AC machine similar to that of DC machine. The instantaneous current magnitude and position of the rotor flux space vector must continuously be known with precision in order to achieve and maintain perfect field orientation. The effectiveness of the proposed control method is verified by using MATLAB/SIMULINK Software and results are presented to validate the effectiveness of topology.

المستخلص

التحكم الموجه للفيض (FOC)، يسمح للمحركات الحثية ذات القدرة العالية باستخدام التحكم الاتجاهي بالتغلب على التأثير المزدوج والاستجابة الديناميكية الضعيفة للتحكم القياسي. الفكرة الأساسية للتحكم الاتجاهي هي تحليل تيار العضو الثابت إلى مركبة المجال المغناطيسي (ids) ومركبة عزم الدوران (iqs) وكلا العنصرين يمكن التحكم عليهما بشكل منفصل لجعل أداء ماكينة التيار التردد مماثلة لماكينة التيار المستمر. القيمة اللحظية للتيار وموضع العضو الدوار يجب أن يكونا معروفين بشكل مستمر بدقة من أجل تحقيق افضل توجيه للفيض المغناطيسي. يتم التحقق من فعالية أسلوب التحكم المقترح باستخدام برنامج SIMULINK/MATLAB وتعرض النتائج للتحقق من فعالية النظرية.

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LIST SYMBOLS

N_s	Synchronous speed
F	Frequency
P	Number of poles
R_s	Stator resistance
R_r	Rotor resistance
L_{sl}	Stator inductance
L_{rl}	Rotor inductance
L_m	Magnetic inductance
R_m	Copper losses resistance
I_m	Magnetic part current
V_s	Voltage source
I_s	Input current
P_g	Air gap power
P_{ls}	Stator copper losses
P_{lr}	Rotor copper losses
V_m	Magnetic part voltage
P_o	Output power
T_e	Development torque
ω_m	Rotor angular speed
S	Slip
ω_e	Synchronous angular speed
Ψ_m	Air gap flux
ω_{sl}	Synchronous angular speed
N_r	Rotor speed
T_M	Developed torque
P_p	Pair of pole
λ_s	Stator flux
λ_r	Rotor flux
L_σ	leakage
Θ_{sr}	Angle between space vector
λ_D	Direct flux
λ_q	Quadrate flux
λ_{dr}	Rotor direct-axis flux
λ_{qr}	Rotor quadrate-axis flux
i_D	Direct current
i_Q	Quadrate current
i_{DR}	Direct current of rotor

i_{Qr}	Quadrate current of rotor
X_{m0}	Magnetizing reactance
τ_r	Rotor time constant

LIST OF ABBERIVIATIONS

DC	Direct Current
FOC	Field Oriented Control
AC	Alternating current
VVVF	Variable Voltage Variable Frequency
VSC	Voltage Source Converter
FHP	Fractional Horse Power
EMF	Electro Motive Force
V/F	Voltage Frequency control method
ASDs	Adjustable Speed Drive
DTC	Direct Torque Control
SVM	Space Vector Modulation
DSC	Direct Self-Control
SPWM	Space Pulse Width Modulation
SVPWM	Space Vector Pulse Width Modulation
PI	Proportional Integral