الاستهلال

قال تعالى :(وَتَرَى الْجِبَالَ تَحْسَبُهَا جَامِدَةً وهِيَ تَمُرُّ مَرَّ السَّحَابِ صُنْعَ اللهِ الَّذِيْ أَتْقَنَ كُلَّ شَيْءٍ)

صدق الله العظيم

Dedication

Every challenging work needs self-efforts as well as guidance of elders especially those who were very close tour heart.My humble effort I dedicate to my sweet and loving

Mother & Father

Whose affection, love, encouragement and prays of dayand night make me able toget such success and honor, Along with all hard working and respected

Teachers

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Abstract

This project describes speed control of separately excited DC motor using Chopper as power converter and PID controller as current controller tuned using fuzzy self tuning PID . The separately excited DC motor can becontrolled from below and up to rated speed. Optimization filter of speed is obtained using Modulus Hugging Approach. After obtaining the complete model of DC drive system, the model is simulated using MATLAB. The simulation is doneand analyzed under varying speed and load torque conditions like rated speed and load torque, half the rated load torque and half speed .

المستخلص

يوضح البحث طريقة السيطرة علي سرعة محرك تيار مستمر ذو اثاره مستقلة باستخدام مقطع (مغير قدرة) باستخدام مسيطر تناسبي تكامليللتحكم في بهذه الطريقة يمكن السيطرة علي سرعة المحرك للوصول للسرعة المطلوبة وموالفة المعاملات عن طريق الموالفة الذاتية باستخدام نظرية المنطق الغامض. تستلم دائرة قدح المقطع الإشارة من المسيطر لتجهيز فولتية متغيرة الي منتج المحرك للوصول للسرعة المطلوبة. تم تصميم وتنفيذ مسيطرين الأول للسرعة والثاني للتيار وذلك للحصول علي سرعة دوران ذات استجابة جيدة و باستقراريه عالية. تم اخذ نموذج لمحرك تيار مستمر ذو اثارة مستقلة وتمثيلة بنموذج محاكاة باستخدام الماتلاب. تم تنفيذ المحاكاة وتحليل النتائج والعلاقات بين السرعة وعزم الحمل مثل علاقة السرعة المطلوبة مع عزم الحمل الكامل والعلاقة بين نصف السرعة المقررة مع نصف الحمل بوجود ملف تحسين السرعة مره وبعدمة مره اخري .

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List of Symbols

ΔI_{qs}	reference current change
B	Viscous friction constant
C	Controller
F	sensor
Ia	Armature current
If	Field current
J	Inertia of the motor
K	Gain
Kd	Derivative gain
KE	A constant based on motor construction
Ki	Integral gain
Kp	Proportional gain
Kt	Torque constant
Kv	Motor constant
La	Armature inductor
Lf	Field inductor
P	plant
r(t)	reference value
Ra	Armature resistor

Rf	Field resistor
s	Standard deviation
T	Period
Td	Derivative time
Td	Developed torque
Ti	Integral time, or reset time
TL	Load torque
u	The inputs to the system
V_{al1}	first edge Triangle membership functions limits
V_{al2}	midterm Triangle membership functions
V_{al3}	last edge Triangle membership functions limits
w	Motor speed
w_{ce}	change in speed error
w_e	speed error
y(t)	output of the system
φ	Magnetic flux

List of Abbreviations

COA	Center of area method
DC	direct current
Dout	Derivative portion of controller output
e	Error
FLC	Fuzzy logic controller
GTO	gate turn on
HCC	hysteresis current controller
Iout	Integral portion of controller output
MIMO	Multi-Input-Multi-Output
NB	Negative Big
NM	Negative Medium
NS	Negative Small
PB	Positive Big
PD	Proportional Derivative
P-I	Proportional Integral
PIC	Proportional-Integral controller
PID	proportional, integral, and derivative
PM	Positive Medium
Pout	Proportional portion of controller output
PS	Positive Small

PWM	pulse width modulation
rpm	Rotation per minute
S.E.D.C	separately excited dc motor
SISO	single-input-single-output