

الآية

قال تعالى :

(إِنَّ فِي خَلْقِ السَّمَوَاتِ وَالْأَرْضِ وَاخْتِلَافِ اللَّيْلِ وَالنَّهَارِ لآيَاتٍ لِّأُولِي الْأَلْبَابِ * الَّذِينَ يَذْكُرُونَ اللَّهَ قِيَامًا

وَقُعُودًا وَعَلَىٰ جُنُوبِهِمْ وَيَتَفَكَّرُونَ فِي خَلْقِ السَّمَوَاتِ وَالْأَرْضِ رَبَّنَا مَا خَلَقْتَ هَذَا بَاطِلًا سُبْحَانَكَ فَقِنَا عَذَابَ النَّارِ).

سورة آل عمران ، الآية (190)-

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DEDICATION

To our parents, for their unstinting support, to our families, who always shared our failures and happiness, to our colleagues, to our friends, Last but not least our deepest gratitude goes to all the teachers.

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Thanks to almighty Allah, by whose grace and mercy this study is accomplished. We would like to express our deep gratitude to our supervisor Ust. Gaffar Babiker Osman for his consistently invaluable advice, encouragement and especially for our project guidance. Also we thank our teachers and the staff of our school for their helpful guidance in our period of study.

ABSTRACT

The Proportional, Integral and Derivative controllers are the most widely used controller in the industries. Simplicity, successful practical applications and near optimal performance are some of the reasons that have made PID control so popular in the academic and industry researches. Recently, it has been noticed that PID controllers are often poorly tuned (obtaining the controller parameters K_p , T_i , and T_d) and some efforts have been made to systematically resolve this matter. Many tuning methods have been proposed for obtaining better PID controller parameter settings. The comparison of various tuning methods for First Order Plus Dead Time (FOPDT) process are analyzed using MATLAB simulation to determine the best method for the system.

مستخلص

المتحكم التناسبي_التكاملي_التفاضلي يستخدم بصورة واسعة في مجال الصناعة. البساطة والتطبيقات العملية الناجحة والقرب من الاداء المثالي بعض الاسباب التي جعلت المتحكم التناسبي_التكاملي_التفاضلي أكثر شهرة في البحوث الصناعية والاكاديمية. مؤخرا لوحظ أن المتحكمات التناسبية_التكاملية_التفاضلية تضبط في أغلب الاحيان بشكل سيء(الحصول على بارامترات المتحكم)؛ لذلك بذلت بعض الجهود لحل هذه المشكلة بإستخدام العديد من طرق الضبط التي اقترحت لضبط هذه البارامترات. استخدم برنامج ماتلاب للمقارنة بين هذه الطرق للانظمة ذات الرتبة الاولى زائد الزمن الميت لتحديد أفضل طريقة للنظام.

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PID	Proportional-Integral-Derivative	
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CHR	Ching-Hong-Reswick	
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FOPDT	First Order Plus Dead Time	41
Z-N	Ziegler-Nichols	
ISE	Integral Squared Error	
ISTE	Integral Squared Time weighted Error	
IST^2E	Integral Squared Time-Squared weighted Error	

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LIST OF ABBREVIATIONS

LIST OF SYMBOLS

Kp	Proportional gain
Ki	Integral gain
Kd	Derivative gain
Td	Derivative time
Ti	Integral time
Pcr	Corresponding period
Kcr	Critical gain
T	Time constant
L	Delay time
K	Gain

