

قال تعالى: ﴿لَا يُكَلِّفُ اللَّهُ نَفْسًا إِلَّا وُسْعَهَا لَهَا مَا كَسَبَتْ وَعَلَيْهَا مَا اكْتَسَبَتْ رَبَّنَا لَا تُؤَاخِذْنَا إِنْ نَسِينَا أَوْ أَخْطَأْنَا رَبَّنَا وَلَا تَحْمِلْ عَلَيْنَا إَصْرًا كَمَا حَمَلْتَهُ عَلَى الَّذِينَ مِنْ قَبْلِنَا رَبَّنَا وَلَا تُحَمِّلْنَا مَا لَا طَاقَةَ لَنَا بِهِ وَاعْفُ عَنَّا وَاعْفِرْ لَنَا وَارْحَمْنَا أَنْتَ مَوْلَانَا فَانصُرْنَا عَلَى الْقَوْمِ الْكَافِرِينَ ﴾

﴿الآية 286﴾

سورة البقرة

Dedication

I dedicate my humble fruit of the spirit of my father, and to my mother, my husband , and my daughter (Tibian) , my brothers and sisters and all my colleagues and to all who pushed me to continue the course of study.

Acknowledgment

I am grateful to my supervisor Dr. Awadalla Taifour Ali who helped me with all hands and passed his knowledge with smile. My sincere thanks to my husband an engineer/ Birrier Abdull Majeed for his great support and ease the difficulties . Finally, I would like to thank all my family

Abstract

The thesis work mainly relies upon designing of compensator especially lead compensator which can be incorporated into the system in order to improve the response of dc motor without affecting the other parameters. Compensators are specially designed under some design constraints like settling time, rise time, peak overshoot and steady state error. Improving steady state error is the key parameter which has to be taken under consideration.

By suitable choice of BLDC motor constants, transfer functions .The mathematical formulation of transfer function and location of poles and zeros has also been studied. The stability of the system can be analyzed by plotting poles and zeros on the root locus plot.

Different compensators are designed by choosing suitable values of poles and zeroes by trial and error method and the corresponding response curves of different compensators are compared.

In order to calculate gain margin and phase margin, bode plot has been plotted. MATLAB is used in order to study different parameters and to plot different response curves.

Also the compensator is designed by using anew technique (non-trail and error method).

The simulation environment provided in the MATLAB SISOTOOLBOX is used to perform experimental analysis. The thesis paves the way for subsequent hardware implementation as an anticipated augmentation to this work.

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اعتمدت هذه الدراسة في عملها علي تصميم المعوض ، وتحديد المعوض المت قدم والذي يستعان به في نظام التحكم من اجل تدسين استجابة محرك التيار المستمر دون المساس بالثوابت الأخرى تصمم المعوضات تبعاً لمتطلبات خاصة منها : زمن الاستقرار ، زمن الصعود ، تجاوز الهدف الأقصى والخطأ عند الاستقرار . تدسين وتقليل خطأ الحالة المستقرة يعتبر الاساس الذي يجب وضعه في الاعتبار.

بالإختيار المناسب لثوابت ودوال تحويل محرك التيار المستمر عديم الفرش فإن التشكيل الرياضي لدالة التحويل وموقع كل الاقطاب والأصفار ستضع للدراسة . كما يمكن تحليل استقرارية النظام برسم الأقطاب والأصفار في مخطط المحل الهندسي للجذور.

معوضات مختلفة تم تصميمها وذلك باختيار قيم مناسبة للأقطاب والأصفار باستخدام طريقة المحاولة والخطأ وتم رسم ومقارنة منحنيات الاستجابة لمختلف المعوضات.

من اجل حساب هامش الكسب و هامش الا طور تم رسم مخطط بودي . استخدم برنامج MATLAB من اجل دراسة المتغيرات ورسم منحنيات الاستجابة المختلفة.

وايضا المعوض تم تصميمه باستخدام تقنية حديثة (طريقة عدم المحاولة والخطأ).

تُستعمل بيئة المحاكاة المدرجة في MATLAB SISOTOOLBOX لإداء تحليل تجريبي. تُمهّد الأطروحة الطريق لتطبيق عملي كزيادة متوّقعة إلى هذا العمل.

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