Dedication

To my parents

To my supportive family

To my beloved country

Acknowledgement

All praise and thanks is due to Almighty God, the creator and sustainer of the worlds. I wish to thank Him for all that He has gifted us with, although, He can never be praised or thanked enough.

My deepest thanks to my supervisor, Ustaz.Abd -Alla Salih Ali, for his patience, support, helpful advices, systematic guidance, and encouragement.

Thanks to all who helped and I forgot to mention them.

Abstract

In this project, a compensated control system was designed using Bode plot technique.

The system required must have a phase margin about 45^0 and gain margin about $35dB$. The original system when plotted the phase margin is 0.005^0. This means that the system need a phase – lead network as a compensator.

The velocity error of the original system is found by using the final value theorem. The maximum phase is obtained from which α was calculated. From Bode plot w_m is obtained at gain crossover frequency and from w_m and α, the lead network transfer function was obtained.

When the obtained transfer function was cascaded with the original system, the required gain and phase margin were obtained.

مستخلص

في هذا البحث،تم تصميم نظام تحكم معوض باستخدام مخطط بود. نظام الـــتحكم المطلوب أن يكون له هامش طور حوالي 45^0 وهامش كسب حوالي $35dB$. النظام الأصلي بعد رسم الإستجابة الترددية وجد أن له هامش طور 0.005^0 ، وبالتـــالي النظام يحتاج إلي معوض تقدمي.

تم إيجاد ثابت السرعة بإستخدام نظرية القيمة النهائية ثم إيجاد أقصي طور ومن ثم تم حساب α.

من مخطط بود تم إيجاد w_m عند عبور مخطط المقدار لخط $0dB$. تـــم إســـتخدام w_m و α لإيجاد ثابت الزمن للمعوض.

عند توصيل المعوض تتابعيا مع النظام وتشغيله تم الحصول علي هوامش الكسب والطور المطلوبين لبناء النظام.

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