A Research on Control Mode of Sun-shading Board Varied with the Solar Orientation

蕭景鉦、李佳言

E-mail: 9607411@mail.dyu.edu.tw

ABSTRACT

The purpose of this study is to set up a sun shading board module with a DC servo motor and integrate with a solar orientation measurement system to achieve interlock control. In order to drive the sun shading board module be operated at optimal angle, the control interface has be established by Visual Basic language with the measurement date of solar orientation. The experimental data indicate that when the initial angle of sun shading board is 25 degrees, the indoor environment is not only comfortable and circulated but also sun-shaded. When the angle is changed to 45 degrees, the module can provide not only a rain-preventing condition but also a natural ventilation indoor environment. In 90 degrees, the largest of range of vision has demonstrated. When the angle be adjusted to largest angle, it is successful to improve indoor brightness because the characteristic of light guide by itself. By the result, it is helpful to develop an optimal indoor lighting control module for improving the living environment more comfortable and energy saving and achieving the target of living technology.

Keywords : DC servo motor, solar orientation, sun shading board

Table of Contents

封面內頁 簽名頁 授權書..... iii 中文摘要..... iv 英文摘要..... v 誌謝..... vi 目錄..... vii 圖目錄..... x 表目錄..... xii 第一章　緒論 1.1前言..... 1 1.2太陽方位及判定..... 2 1.3太陽輻射特性..... 5 1.4研究動機與目的..... 7 1.5研究方法..... 8 1.6文獻回顧..... 8 第二章　馬達驅動系統 2.1馬達驅動系統概述..... 11 2.2馬達驅動系統種類..... 12 2.2.1 DC伺服馬達..... 13 2.2.2同步型(SM)伺服馬達..... 14 2.2.3感應型(IM)伺服馬達..... 15 2.2.4脈沖馬達..... 15 2.2.5永久磁鐵PM式步進馬達..... 16 2.2.6可變磁阻VR式步進馬達..... 17 2.2.7複合式步進馬達..... 17 2.3伺服馬達與步進馬達之特徵..... 17 2.3.1伺服馬達之特徵..... 18 2.3.2步進馬達之特徵..... 19 2.4伺服及步進馬達之差異..... 21 2.4.1伺服馬達..... 21 2.4.2步進馬達..... 21 第三章 控制模組之設計 3.1 系統元件..... 22 3.2 遮陽板種類及構造..... 23 3.3 介面軟體..... 24 3.3.1 Visual Basic 軟體概述..... 25 3.3.2軟體程式..... 26 第四章 結果與討論 4.1 遮陽板角度量測..... 27 4.2 角度重覆性..... 28 4.3 軟硬體整合應用結果..... 29 4.4 討論..... 30 第五章 結論與建議 5.1 結論..... 32 5.2 建議..... 33 參考文獻..... 34

REFERENCES

[1] 天文日曆,中央氣象局編印.

[2] 國民中學童軍教育教師手冊第三冊,國立編譯館主編.

[3] home.kimo.com.tw/glc_scout/skills/direction.htm [4] 魏國彥、許晃雄,全球環境變遷導論 [5] K. Hasse, "Zur dynamic drehzahlgeregelter antriebe mit stromricht ergespeisten asynchron-kurzschlu beta laufermaschinen" ("on the dynamics of speed control of static AC drives with squirrel-cage induction machines ") , Ph.D. Dissertation, Technical University of Darmstadt, 1969.

[6] F. Blaschke , " The principle of field orientation as applied to the new TRANSVECTOR close loop control system for rotating field machines," Siemens Rev., vol. 34, pp. 217-220, 1972.

[7] K. H. Bayer, H. Waldmann, and M. Weibelzahl, "Field-oriented closed-loop control of a synchronous machine with new transvector control system," Siemens Rev., vol. 39, pp. 220-223, 1972.

[8] T. Noguchi and I. Takahashi, "Quick torque response control of an induction motor based on a new concept," IEEE Tech. Meet. Rotating Machine, pp. 61-70, 1984.

[9] I. Takahashi and T. Noguchi, "A new quick response and high efficiency strategy for an induction motor," IEEE IAS Annual Meeting Conf. Rec., pp. 495-502, 1985.

[10] P.C. Sen, Ph. D, Fellow IEEE PRINCIPLES OF ELECTRIC MACHINES AND PRINCIPLES OF ELECTRIC MACHINES AND

POWER ELECTRONICS POWER ELECTRONICS Second Edition (1997), John Wiley and Sons, New York.
[11] Y. A. Chapuis, D. Roye, and J. Davoine, "Principles and implementation of direct torque control by stator flux orientation of an induction motor," IEEE APEC Conf. Rec., pp.185-191, 1995.
[12] Y. Y. Ho and P. C. Sen, "Decoupling control of induction motor drives," IEEE Trans. Ind. Appl., vol. 35, 1988.
[13] 劉家銘, "單邊採光教室裝置導光遮陽板對室內光環境品質改善之研究", 樹德科技大學, 應用設計研究所, 碩士論文, 2003.
[14] R. D. Doncker, F. Profumo, M. Pastorelli, and P. Ferraris, "Comparison of universal field oriented (UFO) controllers in different reference frames," IEEE Trans. on Power Electron., pp.205-213, vol.10, 1995.
[15] B. K. Bose, "Technology trends in microcomputer control of electrical machines," IEEE Trans. on Ind. Electronics, vol. 35, pp.160-177, 1988.
[16] T. A. Lipo, "Recent progress in the development of solid-state AC motor drives," IEEE Trans. Power Electronics, vol. 3, pp.105-117, 1988.
[17] R. D. Doncker and D. W. Novotny, "The universal field oriented controller," IEEE Trans , pp.450-456, 1988.
[18] 江榮富, "伺服精密定位控制之探討" 中原大學, 機械工程學系,碩士論文, 2001.
[19] 陳炯龍、施柏毅、陳佳裕, "三桿六自由度動感平台之監控系統與驅動介面的研製", 逢甲大學, 2002.
[20] H Maekawa，"Compact Servo Driver for Torque Control of DC-Servo Motor Based on Voltage Control"，Proc.of IEEE Int.Conf.on Advanced Intelligent Mechatronics，pp.341-346, 1999.
[21] 林港竣, "步進馬達的控制", 逢甲大學, 資訊工程學系, 專題報告, 2003.
[22] http://tw.knowledge.yahoo.com/question/?qid=1005030904308