









achieving optimal control of system stability .furthermore, we use the higher performance control named Electro-search algorithm to achieve the best system performance stability. Electro-search(ES) algorithm achieving optimal design because it has efficiency in improving characteristic response such as very less settling time , peak overshoot is 0(%) and very small rising time.

#### REFERENCES

- [1] D. B. Fogel, *Evolutionary Computation: Toward a New Philosophy of Machine Intelligence*. IEEE Press, Piscataway, New York, (1999)
- [2] N.I. Ali, "Simulation for Position Control of DC Motor using Fuzzy Logic Controller," MSC thesis, Faculty of Electrical and Electronics Engineering, University Tun Hussein On Malaysia, 2013.
- [3] Sidney R. Bowes, Fellow, Derrick Holliday "New Natural Observer Applied to Speed-Sensor less DC Servo and Induction Motors" *IEEE Transaction Industrial Electronics*, Vol. 51, No. 5, pp. 1025-1032, October – 2004.
- [4] Gwo-Ruey Yu, Ming-Hung Tseng and Yuan-Kai Lin "Optimal Positioning Control of a DC Servo Motor Using Sliding Mode" *IEEE Conference Control Applications*, pp, 272-277 September – 2004
- [5] Ali Mohamed Yousef "Experimental Set up Verification of Servo DC Motor Position Control Based on Integral Sliding Mode Approach" *Wseas Transaction on Systems and Control*, Vol. 7, pp. 87-96, July – 2012, Egypt
- [6] V.M. Alfaro, R. Vilanova, Model reference based robust tuning offive-parameter 2DOF PID controllers for first-order plus dead-time models, in: Proc. European Control Conference (ECC2013), Zurich, Switzerland, 2013, pp. 3931–3936.
- [7] Araki, Mitsuhiro., and Taguchi, Hidefumi. (2003). Two-Degree-of-Freedom PID Controllers, *International Journal of Control, Automation, and Systems*, Vol. 1, No.4, 401-411.
- [8] Ashwaq Abdulameer, Marizan Sulaiman, Mohd Aras, Mohd Shahrieel & Dawood Saleem. " Tuning Methods of PID Controller for DC Motor Speed Control. " *Indonesian Journal of Electrical Engineering and Computer Science*. 3 (2016) 343-349.
- [9] Khaled sailan " DC Motor Angular Position Control using PID Controller for the porpuse of controlling the Hydraulic Pump " *International Conference on Control, Engineering & Information Technology (CEIT'13) Proceedings Engineering & Technology - Vol.1, pp. 22, 26, 2013.*
- [10] A. Jalilvand, A. Kimiyaghalam, A. Ashouri, H. Kord " OPTIMAL TUNING OF PID CONTROLLER PARAMETERS ON A DC MOTOR BASED ON ADVANCED PARTICLE SWARM OPTIMIZATION ALGORITHM " "Technical and Physical Problems of Engineering" (IJTPE) December 2011 Issue 9 Volume 3 Number 4 Pages 10-17
- [11] Kawai, Fukiko., et al.(2007). Automatic Tuning for Model Predictive Control: Can Particle Swarm Optimization find a better parameter?, *IEEE International Symposium on Intelligent Control - ISIC* , pp. 646-651.
- [12] Abhinav, R., Sheel, S.: "An adaptive, robust control of DC motor using fuzzy-PID controller", *Power Electronics, IEEE International Conference on Drives and Energy Systems*, Dec. 2012.
- [13] Ali Madadi and Mahmood Mohseni Motlagh " Optimal Control of DC motor using Grey Wolf Optimizer Algorithm " *Technical Journal of Engineering and Applied Sciences* ©2014 TJEAS Journal-2014-4-04/373-379 ISSN 2051-0853
- [14] Biegler, L.T., Grossmann, I.E., 2004. Retrospective on optimization. *Computers and Chemical Engineering* 28, 1169–1192.
- [15] Boggs, P.T., Tolle, J.W., 2000. Sequential quadratic programming for large-scale nonlinear optimization. *Journal of Computational and Applied Mathematics* 124, 123–137.
- [16] Bohr, N., 1913. On the constitution of atoms and molecules. Part I. *Philosophical Magazine* 26, 1–24.
- [16] Cha, J.Z., Mayne, R.W., 1989. Optimization with discrete variables via recursive quadratic programming: part 1 – concepts and definitions. *Transactions of the American Society of Mechanical Engineers* 111, 124–129.
- [17] Lerner, R.G., Trigg, G.T., 2005. *Encyclopedia of Physics*, 3rd ed. Wiley-VCH, Weinheim.
- [18] Parker, S.P., 1993. *McGraw-Hill Encyclopedia of Physics*, 2nd ed. McGraw-Hill, New York.
- [19] Tarek Hassan Mohamed, Essam Hafez Abdelhamid, Ammar Mostafa Hassan " Real Time Robust Position Controller for a Cart Moved by a DC Motor through MATLAB " *16th International Middle- East Power Systems Conference MEPCON'2014 Ain Shams University, Cairo, Egypt, December 23 - 25, 2014*