A Simulated Annealing-Based Optimal Controller For A Three Phase Induction Motor

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Summary

This paper presents a new approach for optimal controller design of a three-phase induction motor (IM), based on using the simulated annealing (SA) method to find the optimal controller gains that satisfy a specific performance criterion. Optimal control requires well-known information about the system dynamics, which will preclude its applicability with systems having partially known or unknown dynamics. Accordingly; the proposed approach is implemented to emulate the structure and hence the characteristics of the optimal controller in spite of the partially known system dynamics, inaccuracy or uncertainties of system parameter. The problem is a hard nonlinear optimization problem in continuous variables. An adaptive cooling schedule and a new method for variables discretization are implemented to enhance the speed and convergence of the original simulated annealing algorithm (SAA). The proposed algorithm comprises structure of the optimal controller, a new error system and vector control of a three phase IM. The IM is described as a three input, three output controlled object. The state equations of IM suitable for voltage control are implemented based on the vector, method. Simulation results show better system performance compared to previously obtained results.