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Abstract:

In this paper, three single-input fuzzy logic controllers are designed to control field current, armature current and speed of efficiency maximized separately excited DC motor. The necessary of field controller is to maximize the efficiency by tracking the optimized field current for different operating points. In contrary to the conventional fuzzy logic controller which requires at least two inputs variables and nine rules, the proposed controller requires one input and seven rules. However, the performance of the controller is not degraded. The proposed single-input fuzzy logic controllers can be realized by using a simple look-up table which makes faster fuzzy calculation even using an inexpensive digital processor. Using the Matlab/Simuink simulations, it can be shown that the proposed controller exhibits good performance by reducing the steady-state error, and overshoot problems and robustness under the variation of load torque.

Keywords: Single-input fuzzy logic controller, efficiency maximization, field current controller, armature current controller, speed controller, separately excited DC motor