

## A Particle Swarm Optimal Control Method for DC Motor by Considering Energy Consumption

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**Abstract :** In the actual start-up process of DC motors, the DC drive system often faces a conflict between energy consumption and acceleration performance. To resolve the conflict, this paper proposes a comprehensive performance index that energy consumption index is added on the basis of classical control performance index in the DC motor starting process. Taking the comprehensive performance index as the cost function, particle swarm optimization algorithm is designed to optimize the comprehensive performance. Then it conducts simulations on the optimization of the comprehensive performance of the DC motor on condition that the weight coefficient of the energy consumption index should be properly designed. The simulation results show that as the weight of energy consumption increased, the energy efficiency was significantly improved at the expense of a slight sacrifice of fastness indicators with the comprehensive performance index method. The energy efficiency was increased from 63.18% to 68.48% and the response time reduced from 0.2875s to 0.1736s simultaneously compared with traditional proportion integrals differential controller in energy saving.

**Keywords :** comprehensive performance index, energy consumption, acceleration performance, particle swarm optimal control

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