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Steady-state integral proportional integral controller for PI motor speed controllers: A theoretical approach
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Abstract

Windup phenomenon is when a control system operates in a nonlinear region while the controller output exceeds the input limits of the plant being controlled that lead to overshoot, longer settling time and even system instability. Many anti-windup strategies switch into conventional proportional integral control in linear range and manipulating the integral control during saturation, aiming to bring control back into the linear region. A proportional-integral controller with a separate integral controller with its own closed loop and reference value set with respect to the input command and external torque is proposed. This proposed method was able to eliminate overshoot in both load and no load conditions when compared against conditional integration and tracking back calculation schemes using MATLAB/Simulink simulations of an induction motor. © 2015 ICIC International.

Author Keywords

Anti-windup; Conditioning technique; Speed control; Steady-state integral proportional integral control; Tracking back calculation

Index Keywords

Induction motors, MATLAB, Speed control, System stability, Two term control systems; Anti-windup, Back calculation, Conditional integrations, Conventional proportional integrals, Matlab/Simulink simulation, Motor speed controllers, Proportional integral controllers, Proportional-integral control; Controllers

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