

CHATTER FREE SLIDING MODE CONTROL USING FRACTIONAL OPERATOR AND FUZZY LOGIC SYSTEM

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Abstract:

This article investigates transient and steady state performance of sliding mode control using fractional calculus and fuzzy logic system. Sliding mode control is robust to uncertainties but its major disadvantage is severe chattering. To overcome the problem, boundary layer design is used at the cost of loss of robustness. Steady state performance is guaranteed by introducing integral sliding mode control (ISMC); however, the transient response degrades. This work proposes a new sliding mode control method using fractional operator and fuzzy logic system which recovers transient performance and ensures steady performance with minimum chattering. Fuzzy logic system is used to adjust the order of fractional operator. The proposed method is derived for position control of servo system which is subjected to nonlinear disturbance. Numerical simulations confirm superiority of proposed method.

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