Sliding mode control improvement by using model predictive, fuzzy logic, and integral augmented techniques for a quadrotor helicopter model

ABSTRACT

In this paper, a new control method is adopted based on merging multi-input Integral Sliding Mode Control with Boundary Layer (ISMC-BL), Model Predictive Control (MPC), and Fuzzy Logic Control (FLC). The aim of this merging is to take advantage of MPC ability to deals with constraints and to gain optimal solution. Moreover, FLC is considered in designing the sliding surface based on fuzzy rules and tracking error. This method is simulated on a nonlinear quadrotor helicopter model. The results have revealed that the proposed control approach, which is a multiinput Model Predictive Fuzzy Integral Sliding Mode Control with Boundary Layer (MPFISMC-BL), is a robust, stable, optimal, and intelligent control scheme. This finding could contribute to improve the control of similar systems.