

## Evolved Bat Algorithm Based Adaptive Fuzzy Sliding Mode Control with LMI Criterion

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**Abstract :** In this paper, the stability analysis of a GA-Based adaptive fuzzy sliding model controller for a nonlinear system is discussed. First, a nonlinear plant is well-approximated and described with a reference model and a fuzzy model, both involving FLC rules. Then, FLC rules and the consequent parameter are decided on via an Evolved Bat Algorithm (EBA). After this, we guarantee a new tracking performance inequality for the control system. The tracking problem is characterized to solve an eigenvalue problem (EVP). Next, an adaptive fuzzy sliding model controller (AFSMC) is proposed to stabilize the system so as to achieve good control performance. Lyapunov's direct method can be used to ensure the stability of the nonlinear system. It is shown that the stability analysis can reduce nonlinear systems into a linear matrix inequality (LMI) problem. Finally, a numerical simulation is provided to demonstrate the control methodology.

**Keywords :** adaptive fuzzy sliding mode control, Lyapunov direct method, swarm intelligence, evolved bat algorithm

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