Study on Bifurcation Analysis and Takagi-Sugeno Fuzzy Sampled-Data Stabilization of PMSM Systems

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Abstract

The bifurcation, stability and stabilization analysis of permanent magnet synchronous motor (PMSM) systems are investigated in this paper. To begin, a new class of delay-dependent sufficient conditions is suggested with respect to the information of the membership function, a relevant Lyapunov-Krasovskii functional (LKF), and the overall information connected with the real sampling pattern, so that the fuzzy system is ensured to be stable with a weighted dissipativity efficiency. Second, sampled-data control is intended to stabilize the Takagi-Sugeno (T-S) fuzzy system with specified integral inequalities based on the obtained results. The required conditions are stated in terms of the feasibility of linear matrix inequalities (LMIs) under the dissipativity output index, and can readily be verified by MATLAB toolbox. Finally, verification examples are contributed to demonstrated the efficacy of the techniques established in this paper.

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