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T-S Fuzzy Modeling Based on Power Coefficient Limit Nonlinearity Applied to an Isolated Single Machine Load Frequency Deviation Control

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Abstract : Takagi-Sugeno (T-S) fuzzy model based control of a load frequency deviation in a single machine with limit nonlinearity on power coefficient is presented in the paper. Two T-S fuzzy rules with only rotor angle variable as input in the premise part, and linear state space models in the consequent part involving characteristic matrices determined from limits set on the power coefficient constant are formulated, state feedback control gains for closed loop control was determined from the formulated Linear Matrix Inequality (LMI) with eigenvalue optimization scheme for asymptotic and exponential stability (speed of esponse). Numerical evaluation of the closed loop object was carried out in Matlab. Simulation results generated of both the open and closed loop system showed the effectiveness of the control scheme in maintaining load frequency stability.

Keywords : T-S fuzzy model, state feedback control, linear matrix inequality (LMI), frequency deviation control
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