

ABSTRAK

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Program Studi : Teknik Elektro
Judul : Perancangan dan Simulasi Mobile Robot Tipe Truk-Trailer
Menggunakan Sistem Kendali LMI-based Fuzzy

Tesis ini membahas penurunan model fuzzy Takagi-Sugeno dari sistem truk dengan tiga trailer, dan perancangan pengendali fuzzy dengan menggunakan konsep *parallel distributed compensation* (PDC). Analisa masalah kestabilan dan disain pengendali menggunakan algoritma optimisasi linear matrix inequality (LMI), dengan meninjau kondisi yang melibatkan kestabilan, *constraint* pada input dan output, dan kondisi awal independen. Validasi model dengan indikator kinerja *variance accounted for* (VAF) menunjukkan bahwa model fuzzy yang dibuat menunjukkan kesesuaian yang sangat baik terhadap model nonlinear. Hasil simulasi menunjukkan bahwa pengendali fuzzy memperlihatkan kemampuan pengendalian yang baik sesuai sasaran pengendalian yakni menggerakkan truk-trailer dalam arah maju dengan memberikan titik acuan yang akan dicapai oleh truk-trailer.

Kata Kunci :

Constraint, LMI, model fuzzy Takagi-Sugeno, PDC, pengendali fuzzy, sistem nonlinear, sistem truk-trailer, VAF

ABSTRACT

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Study Program : Electrical Engineering
Title : Modelling and simulation of Truck-Trailer Mobile Robot by using LMI-based Fuzzy Control

This thesis describes modelling of Takagi - Sugeno fuzzy model from the non linear system of truck-trailer and design of model based fuzzy controller utilizing the concept of parallel distributed compensation. The stability analysis and control design problems are reduced to linear of matrix inequality (LMI) problems. In applying the LMI-based fuzzy control design to the truck-trailer model system, this thesis investigated design condition involving stability, constraint on the input and output, and initial state independent condition. Validation of model Fuzzy T-S derived from the non linear system Truck-Trailer yields good performances indicator by using performance parameters 'variance accounted for' (VAF). The simulation results show that the design fuzzy controller can effectively achieved the control objectives i.e. to drive forward the truck-trailer into the straight line that was carried out by giving a reference point that will be followed by truck-trailer.

Key words:

Constraint, fuzzy controller, LMI, PDC, nonlinear system, Takagi-Sugeno fuzzy model, truck-trailer system, VAF