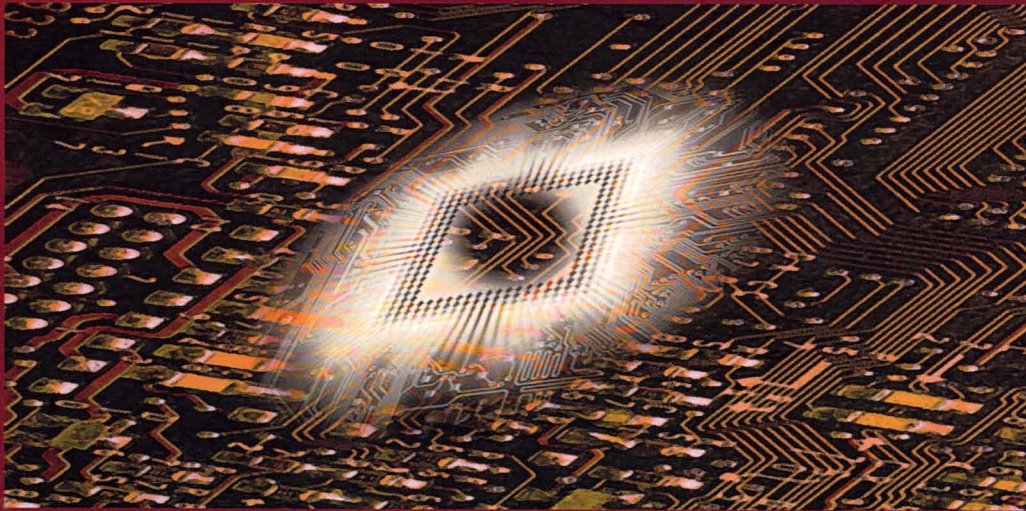


COMPUTATIONAL INTELLIGENCE IN ROBUST CONTROL

Theory and Applications



Rini Akmeliawati

Research Management Centre
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA



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Chapter 6

INTELLIGENT ROBUST CONTROL FOR PRECISE TRACKING PERFORMANCE OF X-Y POSITIONING SYSTEM

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Abstract

In this chapter, design and implementation of an intelligent H_∞ -based precision control system is presented for AC induction servo motor drive X-Y Table positioning mechanism. The system works with a robust feedback control, which is enhanced by an outer loop integral control. Model error modeling identification technique is modified using an adaptive neuro fuzzy inference system (ANFIS) to estimate the uncertainties precisely. ν -gap metric is used to quantify and validate the resulted uncertainty weighting function and to ensure the largest possible stability margin. Meanwhile, the effect of crosstalk between the two axes is considered as disturbance that is treated by intelligent identified disturbance weighting functions using ANFIS. The developed controller is implemented experimentally using host target PCs. From the simulated and experimental results system's uncertainties and disturbances are precisely located, and robust stability and performance are obtained. Moreover, the tracking and contouring