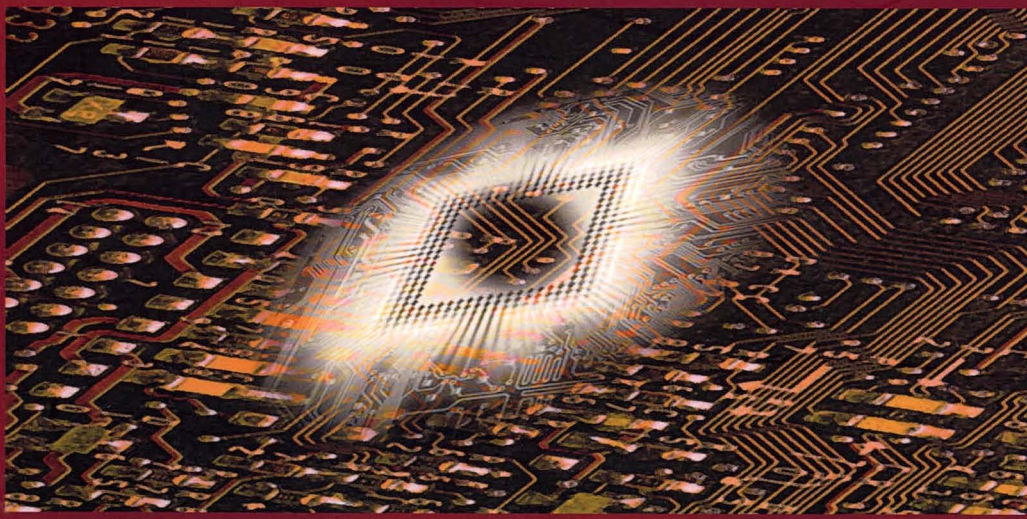
COMPUTATIONAL INTELLIGENCE IN ROBUST CONTROL

Theory and Applications



Rini Akmeliawati

Research Management Centre
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Chapter 3

OPTIMIZED LQR CONTROLLER SYNTHESIS FOR 3DOF HELICOPTER USING MULTI-OBJECTIVE DIFFERENTIAL EVOLUTION (MODE)

Ismaila B. Tijani*, Rini Akmeliawati*, Ari Legowo**,
Asan G.A. Muthalif*
Intelligent Mechatronics Systems Research Unit,
*Department of Mechatronics Engineering,
**Department of Mechanical Engineering,
International Islamic University Malaysia
Kuala Lumpur, Malaysia

Abstract

This chapter presents the formulation of LQR controller design as a Multi-objective optimization Problems (MOP) and discusses the application of pareto-based Multiobjective Differential Evolution (P-MODE) technique to address the challenges of design parameters selection in LQR synthesis. The effectiveness of the proposed optimized LQR is validated on a laboratory scale 3DOF helicopter system. The procedure was able to yield set of pareto-based optimal controller solutions with satisfactory performances in terms of both state and control regulations (in time-domain). Performance comparison of the resulting MODE-LQR controller with an LQR controller supplied by the manufacturer of the plant indicates the effectiveness of this approach for better performances. This approach is expected to facilitate the design of LQR especially for complex and high dimension problem like a helicopter system in which the manual tuning usually proved to be tedious and time-consuming.