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بسم الله الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني



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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
على هذه الأقراص المدمجة قد أعدت دون أية تغييرات





Cairo University

MULTI-OBJECTIVE OPTIMIZATION MEASURES: A COMPARATIVE ANALYSIS

By

Abdel-Rahman Ali Mohamed Ahmed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE

**In
MECHANICAL DESIGN & PRODUCTION ENGINEERING**

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Dedication

To My Mother whose memory lingers

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Title of Thesis:

Multi-objective Optimization Measures: A Comparative Analysis

Key Words:

Multi-Objective Optimization; Evolutionary Algorithms; Quality Metrics; Multi-Objective Optimization Indices; Penalty Function.

Summary:

The purpose of this thesis is to make a comparative analysis between a set of quality indices using a set of benchmark problems of different natures, type of constraints, number of decision variables, and different number of objective functions. Two famous optimization algorithms NSGA II [1], and SPEA 2 [2] well known are coded and used for solution of optimization problems. Some quality Indices are dependable and changeable according to the problem nature, number and type of constraints, number of decision variables, and number of objective function for optimization. Some quality Indices are eliminated and not significant in measuring the quality of optimization problems. Results indicate that Regular optimization algorithms are not able to handle constrained functions. Modification of the selection strategies for Genetic Algorithm can lead to set trade off solutions as close to Pareto over the entire objective space, and The modified NSGA II (M-NSGA II) is better than regular NSGA II or NSGA II with Penalty function approach with respect to both convergence and diversity. All Pareto front are evaluated in terms of 12 Quality Measures developed [1, 2, and 3]. These 12 Measures are then reduced to seven meaningful Quality indices. Benchmark problems with 2 and 3 objectives subject to equality and inequality constraints are employed.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

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