

# Derivative Free Optimization Algorithms in the Electrical Machine Design

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## Abstract

This paper deals with the analysis of three derivative free optimization algorithms in the Electrical Machine Design. An analytical model, recently proposed as a benchmark, is used to compare the Genetic Algorithm, the Particle Swarm Optimizer and the Pattern Search Method. The problem is highly multimodal and has 10 optimization variables. It consists on a wheel motor for a race solar car that uses rare earth permanent magnets (SmCo) in the inner stator, with radial flux. The motor has windings on the outer rotor. The objective function is the maximization of the efficiency with magnetic constraints, thermal constraints and constraints linked to the converter.