Implementation of Hybrid Particle Swarm Optimization for Combined Economic-Emission Load Dispatch Problem

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Abstract - This paper presents the implementation of hybrid particle swarm optimization for solving Economic-Emission Load Dispatch Problem (EELD). Due to environmental issues, the environmental pollution releases by thermal power generation should be considered in power dispatch planning instead of minimizing the total fuel cost only. Significant emission reduction can be achieved by performing the emission power dispatch. In this study, the hybrid Evolutionary programming (EP) and Particle Swarm Optimization (PSO) named Evolutionary Particle Swarm Optimization (EPSO) is proposed. The effectiveness of the EPSO algorithm has been tested on the IEEE 30 bus system and the results obtained are compared with the other reported algorithms. The results also reveal the capability of the proposed EPSO for obtaining the best fuel cost and emission amount at shorter time compared to PSO.

I. INTRODUCTION

This optimization problem presents a highly nonlinear and non-convex optimization problem that may consist of many local optimal points. Hence, dedicated research efforts are required to solve this kind of optimization problem.

Many optimization methods have been proposed for solving both ELD and EELD problem which can be categorized into traditional method, metaheuristic method and hybrid method. In traditional method such as lambda iteration (LI) [2], gradient method (GM) [3], linear programming (LP) [4] and quadratic programming (QP) [5] are highly dependent to the convexity and continuity of the objective function. In other word, it required continuously differentiable objective function that makes this method restricted to the shape (convexity or continuity) of the objective function.

However, the metaheuristic method is capable to solve...