OPTIMAL GENERATION DISPATCH OF ELECTRICAL ENERGY PRODUCTION SYSTEM

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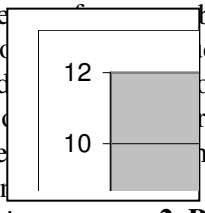
Abstract: *This paper presents an efficient and reliable algorithm to solve the optimal generation dispatch problem in a robust, flexible and fast way, and which retains the same performances for either a small or a large-scale problem. This algorithm is based on the use of augmented Lagrangian. In order to verify the effectiveness and the performances of the proposed algorithm, it was tested on an electrical power system composed by five power plants linked to an electrical transmission network. The test results show that the optimal solution is obtained with moderate calculation effort and the convergence was very fast and without oscillations. Moreover, the adjustment of the parameters of the method is easy.*

Key words: *optimal generation dispatch, generating cost, operating constraints, augmented Lagrangian method.*

1. Introduction

The objective of the optimal generation dispatch is the minimization of total cost function whereby the outputs of controlled plants are determined to minimize the total operating cost for a given load of the system, taking into account the transmission losses. It is important to recognize the very high level of fuel cost: this high cost is the motivation for attaining considerable accuracy in the economic optimal generation dispatch. Even a small percentage change in accuracy in an optimal dispatch may result in a considerable saving in fuel cost.

The optimal generation dispatch of such a system is a problem of great complexity due to its dimension and to the diversity in the process of production. The methods and the current me[illegible] calculation, do not allow getting a general so[illegible] [1] for this problem. In this present stud[illegible] propose an algorithm for the solution [illegible] economic optimal generation dispatch proble[illegible] system composed only by thermal power pla[illegible]



The factors influencing power generation at minimum cost are operating efficiencies of generators, fuel cost, and transmission losses. The most efficient generator in the system does not guarantee a minimum cost as it may be located in an area where fuel cost is high. Besides, if the plant is located far away from the load center, transmission losses may be considerably higher and hence the plant may be overly uneconomical.

To solve this problem we have proposed to use the augmented Lagrangian method [1-6]. This method is a useful one among the non linear programming methods [5]. This method is considered as a combination of two methods: penalty function method and local duality method (multiplier of Lagrange). The two methods work together in a way to moderate the disadvantages associated with one or the other method alone. It allows the transformation of a constrained problem into an unconstrained problem and which does not include any additional variable [2, 5].

The augmented Lagrangian method has several advantages; Easy programming for a given [illegible]blem, give a great flexibility in changing the [illegible]cture of a complex problem with a more [illegible]orable problem and include the detailed [illegible]resentations which are not possible with other [illegible]niques.

2. Problem formulation

The economic optimal generation dispatch problem is to select the power to be produced by each plant of the system so that the overall generating cost is minimal, the total electric power