LAGRANGIAN RELAXATION METHOD FOR SOLVING UNIT COMMITMENT PROBLEM

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ABSTRACT

Unit commitment problems are well known in the power industry and have the potential to save millions of dollars per year in fuel and related costs. It is an area of production scheduling that relates to the determination of the on/off status of the generating units during each interval of the scheduling period, to meet system load demand and reserve requirements at minimum cost, which are subjected to a variety of equipment, system and environment constraints. It is useful in large generation electricity to help minimize cost of operation. In this project, systems with twenty generators are chosen to demonstrate the capability of program. Lagrangian Relaxation method is chosen to solve this problem. It is a complex combinational optimization problem to show how unit commitment works. The main objective of this project is to use Langrangian Relaxation method to solve unit commitment problems.

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CHAPTER ONE

INTRODUCTION

1.1 POWER SYSTEM ECONOMIC OPERATION

The electrical power system is one of the most complex systems in the present civilization. In any power system, the main objective is to satisfy consumer's demand, however simultaneously other objectives which are rather important have to be considered. Among these objectives are:

i. The cost of energy supplied to the consumers must be as minimum as logically as possible
ii. The electricity provided must not only meet a specified load demand but also must be continuous and reliable.
iii. Special care must be taken to ensure that both personnel and equipment are given maximum protection.
iv. The generation of electricity must also not pose a threat to the environment.

After safety considerations, the monetary factor is of prime importance because as with many industries, costly forms of operation are often undesirable. Therefore, the economic operation of a power system refers to the process of minimizing its production costs. These production costs include capital costs, fuel costs, maintenance costs, and also both labour and administrative costs.

For short term planning of power system operations, the prime objective of system operators is to meet the load demand at the lowest cost. Demand increases and decreases according to consumers activities; see typical daily load demand curve in Fig 1.1. For instance, it usually increases at the beginning of the day and remains at peak value for some time. Towards the end of the day, when consumers' activities decline, demand also