SHORT TERM DISPATCH MODEL FOR SRI LANKA HYDROTHERMAL POWER SYSTEM

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By

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DECLARATION

The work submitted in this thesis is the result of my own investigations.

This subject has not been accepted for any degree so far, and is also not being currently submitted for any other degree by any other individual.

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24-01-2006

We endorse the declaration by the candidate.

UOM Verified Signature

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Abstract:

As a short-term dispatch guide, presently manual methods are used by CEB with experience gathered for years and with the directions given by a computer model named Medium Term Reservoir Optimization (METRO) model, which is for medium term dispatch planning. This is done for one-year time horizon in monthly rolling basis.

There is no Short Term Dispatch tool used for power dispatch in CEB power system.
A Short Term Dispatch Model (**STDM**) consisting of three sub models of Unit Commitment Model, Optimal Dispatch Model and Dynamic Stability Model were developed in my research project.

This is virtually a user-friendly operational model, which may be applicable for the present system and may be used without any change in the five-year transmission and generation planning horizon and may be developed with further development of the Transmission/Generation expansions [14].

The Unit Commitment Model is a judgmental model. Thus unit commitment can be decided by the operator depends on the water requirement for irrigation purposes, sudden unexpected inflows to hydro catchments, plant outages for routine and breakdown maintenance etc.

According to the unique characteristic of Sri Lanka power system almost all of the available plants are to be committed. The plants not to be committed are covered by the optimal/economic dispatch solution in the optimal dispatch model [ODM].

Optimal Dispatch Model [ODM] was developed on MATLAB platform based on incremental cost principal developed by the method of Lagrange Multipliers based on Kuhn-Tucker Theory. [2]; [8] . MATLAB is a language of Engineering Computation. The user interface for input and output are user friendly Excel Work Sheets. Further graphical out puts also given on MATLAB platform.

The inputs are twenty-four hours demand on hourly basis, the plant Maximum and Minimum MW limits and cost parameters. The cost parameters are the unit costs of thermal plants and water values given by the **M**edium **T**erm **R**eservoir **O**ptimization model used by System Control Center of CEB.

Dynamic Stability Model was developed based on the definitions of rate of change of frequency and the load reduction factor to see the frequency response of the power system under generation throw off condition of the power system. Frequency is the main dynamic indicator used in system operation [11]; [12]; [13]. The model covers the frequency response with the effect of the system inertia, load reduction factor, all automatic under frequency load shedding stages and the governor response of the system[6].

This is a single bus model and with the application it was found to be very user-friendly to the CEB system operator to use at the control desk.

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