

Modeling the optimum distribution of active power between plants by using thermal function

Imad H. Ibrik

Energy Research Centre – An Najah National University, Nablus P.O. Box 7 West Bank, Palestine, Israel

Received 19 May 2002; received in revised form 14 October 2002; accepted 17 October 2002

Abstract

This paper presents a new algorithm for optimal power flow (OPF) based on thermal function techniques. The algorithm considers two sub-problems seeking for minimum cost of generation and minimum system transmission loss. These have been solved sequentially to achieve optimum allocation of real and reactive power generations with due consideration to system operating constraints pertaining to generation, bus-voltage and line flow limits. New models for handling system constraints have been developed to suit the thermal function based OPF algorithm. The mathematical models and algorithms are so developed to be solved by means of computer simulation of optimal power system models by thermal function. The potential of the new algorithm of OPF has been demonstrated through system data for electrical network. Results reveal that the proposed new algorithm has potential for on-line OPF solution.

© 2002 Elsevier Science B.V. All rights reserved.

Keywords: Power system; Optimization; Thermal function; Fuel cost; Power generation

1. Introduction

In an optimal power flow (OPF) problem, total fuel cost and total transmission loss or some other appropriate objective functions are minimized subject to the system constraints. A lot of research work has been carried out in the past in the OPF area using several optimization techniques such as classical, linear, quadratic and non-linear programming methods. Lezjnyouk and Paotkina, in his review paper [1] concluded that thermal function method can be used to solve the problem of minimizing the active power losses in the electrical network, by simulating the network as active resistances (R-network) and find regulating devices will lead to optimum or economic distribution of currents in the networks [1]. In this paper, the thermal function is used to solve the multiple objective optimization problem associated with minimization of generation costs and minimization of transmission losses of a power system, as a one objective function.

The new algorithm for solving the OPF problem considered the twin sub-problems of minimizing total fuel cost and total system loss for optimum allocation of active and reactive power generations and transformer tap settings. The algorithm uses a new approach for linearizing various system constraints the two sub-problems have been solved sequentially till both cost of generations and system loss converge to a pre-specified tolerance.

The potential of the new algorithm for OPF has been demonstrated through data for power system consisting of three thermal stations and seven buses, and the results obtained by simulated model are shown in Section 6 with the relevant conclusions.

2. Thermal function

In technological systems a number of processes occur in such away that the response is minimized.

Maxwell definition that in a DC source, the current flow in the resistances in such away that the power will be minimized due to dissipation along the resistances [1].

E-mail address: iibrik@yahoo.com (I.H. Ibrik).

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات