

COST ALLOCATION OF TRANSMISSION SYSTEMS FOR REACTIVE POWER

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Rezumat. În această lucrare, autorii propun determinarea alocării puterii reactive luând în considerare pierderile și costul acestora folosind metoda factorilor de distribuție. Compararea se realizează folosind metoda Bialek, bazată pe un metodă topologică pentru determinarea contribuțiilor generatoarelor (consumatorilor) la circulațiile individuale de puteri prin elementele de rețea. Studiul de caz se referă la un sistem cu 12 noduri, având 6 surse și 9 consumatori.

Abstract. In this paper, the authors propose the compute of reactive power allocation considering their losses and their cost using the distribution factors method. The comparison is performed using Bialek method, based on a topological approach for determining the contributions of generators (consumers) to individual power flow through network elements. The case study refers to the 12 buses test power system, heaving 6 P-U buses and 9 P-Q buses.

Keywords: cost allocation, power systems, reactive power, tracing method, distribution factors

1. Introduction

Reactive power has a dominant effect on real energy transfer and an appropriate management of reactive power is very essential for supporting power system security. On the other hand, while reactive power production cost is highly dependent on active power generation, it is mainly confined to local consumption. Most researches have been focused on active power as the main good transacted in electricity markets and reactive power is studied less and superficial. As a result, to avoid market power and to maintain the secure operation of the system, a fair cost allocation method seems to be very essential.

Several methods have been developed to solve the allocation problem for reactive power costs. The Zbus method presents a solution based on Zbus matrix and considers the current injection at each bus [1], [2]. Methods based on proportional sharing principle provide efficient procedures for reactive power and reactive losses. References [3], [4], [5], [6] are example of these method.

These paper presents the distribution factors methods for reactive power allocation, considers active and reactive power losses. There are 3 categories of

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