PHASE SHIFT TRANSFORMER

Description

In the conditions of the power market liberalisation necessity application of corresponding means of management of capacity streams increases in transport and distributive networks of electropower systems. It has led to occurrence of family of the management devices called FACTS controllers (Flexible Alternative Current Transmission Systems) and special installations including all set and the devices providing compulsory management by modes of electric networks. Into the list of the most considerable representatives of family FACTS controllers enter also so-called phase shift transformers (Phase Shifting Transformers-PST) which can be used as independently, and in a combination to other elements, that considerably expands area of their application.

By present time following directions of practical use of phase shift transformers were defined:

- Forced redistribution of loading in non-uniform transport networks.

- Regulation of power flows in the lines containing inductive short circuit current limiters.

- Flexibility increase of electric communications with longitudinal compensation.

- Ice fusion on wires of air-lines of the branched out transport network.

- Work of high-voltage electric communications in a mode of an adjustable source of a current (IPC-Interphase Power Controller).

The big expectations are connected and with application of high-speed phase shift devices on the basis of power thyristors switchers that will provide efficient control the dynamic processes connected with electromechanical fluctuations of rotors of synchronous machines. In connection with possible essential increase of a role and value of these devices there is also a necessity of their further perfection regarding decrease weight-dimensional and cost indexes, and also increase of their controllability. On the basis of spent in Institute of power engineering of Academy of Sciences of Moldova researches it has been developed and new technical solution of PST (Fig. 1), possessing a number of essential technical and economic advantages in comparison with existing is offered.

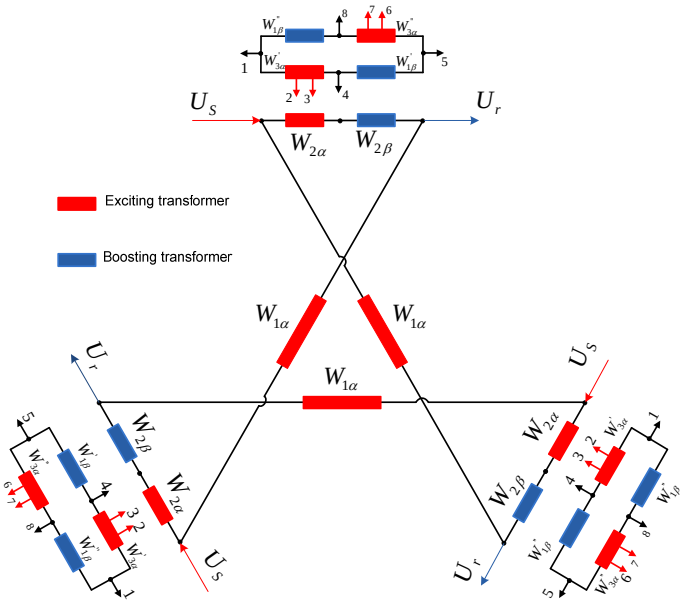

Fig.1. Technical solution of proposed PST

Innovative Aspect and Main Advantages

Developed technical solution of PST as well as other similar installations consists of two transformers: the basic and adjusting. Originality of the offered technical solution consists in a way of realisation and switching between windings of adjusting and additional transformers. It allows lowering the established capacity of installation approximately on 25%, keeping the same transferring ability (fig. 2). The offered technical solution allows reducing twice a current and working voltage of the adjusting transformer, provides 7 steps of regulation of a phase shift corner. For the given scheme, the electronic switcher also is developed for a choice of a necessary corner of shift which has the total established capacity lower on 33% than standard solutions. The given innovative properties allow to increase management of degree and speed of power supply system mode, and also allows to increase the established capacity of installation located structurally in one tank.

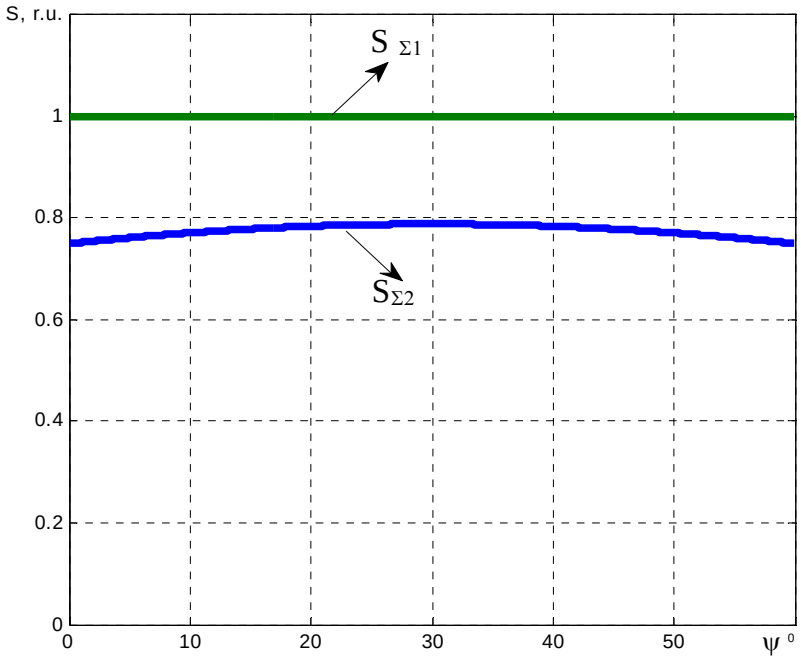

Fig.2. Comparison of installed power of standard and proposed technical solution $S_{\Sigma 1}$ - total installed power of standard PST; $S_{\Sigma 2}$ - total installed power of proposed PST

Stage of Development

The proposed technical solution is covered with:

1. Moldova Patent MD 3823

2. Moldova Patent MD2652