

Interconnected power system control by using of the phase angles values of the nodal voltages

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Results

The usage of the control system which is based on synchronously measured phase angles values of the nodal voltages will improve control reliability in load flow, decrease the transient time and prevent the asynchronous mode beginning.

The mathematical models of the power system elements are developed which allow evaluating the effectiveness of the vector control on the basis of phase angles and nodal voltages in different power system states. In particular, the research of the station and network control systems will allow adjusting the regulator parameters to provide the desired transient quality.

The analysis of the information traffic and unsynchronization time has been done. On basis of the research the conditions are determined which allow minimizing the accuracy of angle measurements and time delays during the synchronization in the event of using the existing communication channels. It was established that the unsynchronization time and accuracy of angle measurement are 46 ms and 836 degrees respectively. It was also established that time delay is 58 ms when the information signals are transmitted to upper control level.

On the basis of the undertaken studies it's proposed to synchronize by using GPS-technology (unsynchronization time and accuracy of angle measurements are 0.03 ms and 0.5 degrees respectively). In this case time delay is 0.07 ms.

The control criterion of AGC-system is improved by using the variable K-factor in the event of interconnected operation of Ukrainian and Russian interconnections. This will allow decreasing the transient time as well as power flow errors.

In the event of interconnected power systems control methods are developed in which the phase angle values are used.