

Investigating the Regulation System of the Synchronous Motor Excitation Mode Serving as a Reactive Power Source

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Abstract : The efficient usage of the compensation abilities of the electrical drive synchronous motors used in production processes can essentially improve the technical and economic indices of the process. Reducing the flows of the reactive electrical energy due to the compensation of reactive power allows to significantly reduce the load losses of power in the electrical networks. As a result of analyzing the scientific works devoted to the issues of regulating the excitation of the synchronous motors, the need for comprehensive investigation and estimation of the excitation mode has been substantiated. By means of the obtained transmission functions, in the Simulink environment of the software package MATLAB, the transition processes of the excitation mode have been studied. As a result of obtaining and estimating the graph of the Nyquist plot and the transient process, the necessity of developing the Proportional-Integral-Derivative (PID) regulator has been justified. The transient processes of the system of the PID regulator have been investigated, and the amplitude–phase characteristics of the system have been estimated. The analysis of the obtained results has shown that the regulation indices of the developed system have been improved. The developed system can be successfully applied for regulating the excitation voltage of different-power synchronous motors, operating with a changing load, ensuring a value of the power coefficient close to 1.

Keywords : transition process, synchronous motor, excitation mode, regulator, reactive power

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