

Transient processes in asynchronous electric drive with individual reactive power compensation in case of loss of supply voltage

The article discusses the problem of calculation of transient processes in asynchronous motors that work with switched in parallel capacitors in case of loss of supply voltage. The basis of the algorithm is a mathematical model of asynchronous motor that includes magnetic saturation of motor as the main magnetic flow and the flow dispersion, and current extrusion in the bars of the rotor.

Researching the dynamics of processes uses three-phase coordinate system in which the stator winding is not converted, and the rotor winding is changed to a three-phase fixed, so that the equations of electric balance include electromotive force caused rotor rotations. Taking into consideration saturation the mathematical model of the motor uses magnetization curves of the main magnetic flow, dispersion flows of stator winding, dispersion flows of rotor winding including flows closed through gear teeth, which leads to saturation. Taking into consideration current extrusion in the bars of the rotor is made through partition into n parts by height, as a result mathematical model of the motor considers mutually fixed windings: three-phase stator winding and n three-phase rotor windings. Calculation of transient process is realized by numeric integration of system of differential equations composed by Kirchhoff's laws for loops of the stator and rotor having mutual inductive communications, and equations of the rotor dynamics. The elements of the Jacobi matrix of the system is a full matrix of self- and mutual differential inductances of the loops of the system, which are based on the corresponding magnetization curves.

Designed algorithm and based on it program for calculation processes in system asynchronous motor – capacitors gives an opportunity to investigate the dynamics of the processes in case of loss of supply voltage with different values of capacitance of capacitors. It should be used for validation of the selected from static characteristic value of capacitance of capacitor in dynamic modes, as in this case overvoltages can appear caused by resonance phenomenon and self excitation.

Key words: *asynchronous motor, transient processes, capacitive compensation*