AUTOMATED ELECTRIC DRIVE OF THE STACKER CRANE

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The main element of automated warehouses are stacker cranes, which work in manual and automatic control mode. The performance of the entire technological complex depends on the reliability of the operation of the electric drives for moving the stacker crane. Therefore, the task of developing an automated electric drive for the movement of the stacker crane is urgent and provides the following modes: smooth acceleration and braking, precise stopping 10mm, stable speed of movement, adjustment range over 10:1, acceleration limitation. The developed frequency-regulated asynchronous electric drive meets the specified requirements, its computer model is shown in the fig. 1.

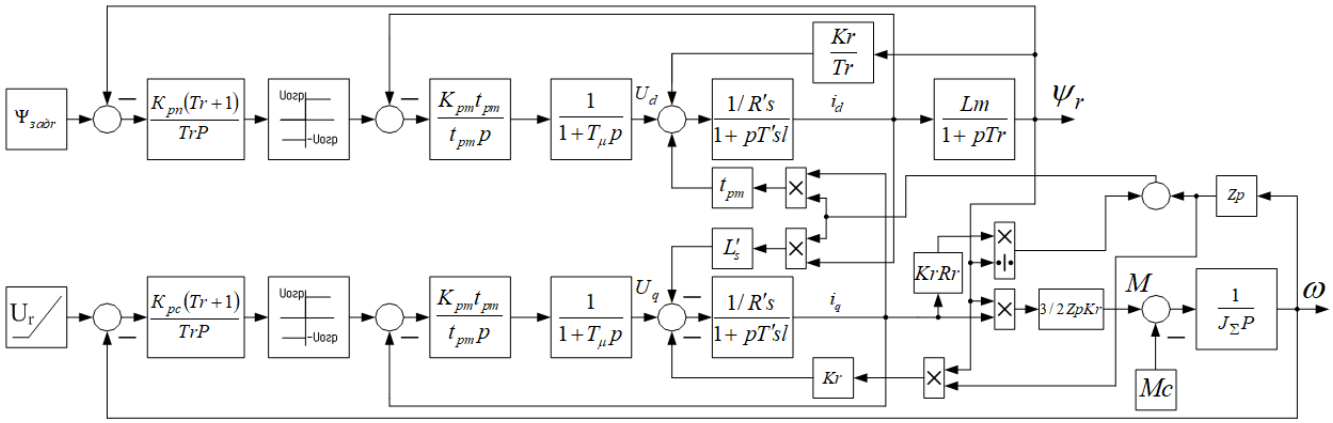

Fig. 1 – Structural diagram of the electric drive moving of stacker crane

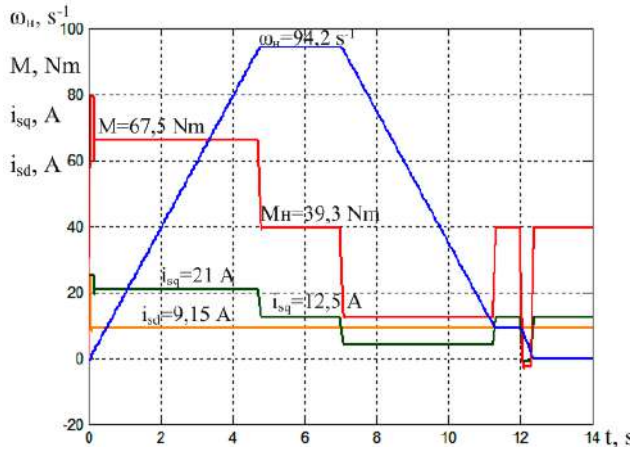

Fig. 2 – Dynamic processes in the electric drive of stacker crane

The control system is based on the mathematical description of an inductions motor in an orthogonal coordinate system oriented along the vector of the rotor flux linkage. The control system has two control channels: channel for stabilizing the rotor flux linkage module and channel for controlling the rotor speed. This system is based on flux linkage controllers, speed controllers, current controller along the d-axis and q-axis. All controllers are PI types, which ensures that there is no static error. Computer modeling shows the performance of the developed system. When the system is operated from the ramp generator, the acceleration time is 4.7 s and the acceleration of the electric drive does not depend of the load. The steady dynamic motor current reaches i_{sq}=21 A. The set limit in the speed controller leads to the limitation of the motor current in emergency modes.