***V. Moroz, V. Stefanyuk, V. Tsyapa***
National University "Lviv Polytechnic"
***G. Sivyakova***
(The Karaganda State Industrial University, Kazakhstan)

# THE DYNAMIC ANALYSIS OF THE MINING SHOVEL TWO-MOTORS SWING DRIVE

Mining shovels are widely used in open cast workings of mining and usually use electric drive. Swing drive is the most difficult part because of the requirements for the electric drive and their implementation. Mechanical parts of the drive has long shafts that create elastic joints and significant backlash, which will eventually only grow because of wear parts and enhance grip in shock, reducing resource efficiency. The investigation of these phenomena due to the complexity of electromechanical processes with large fluctuations is quite problematic and without computer simulation is impossible.

The study of the dynamics of electric career excavators conducted at the Department of Electric Drive of the "Lviv Polytechnic" showed that the estimated unbranched mechanical systems due to main mass and stiffness with sufficient accuracy to analyze can mostly be reduced to three-mass or two-mass equivalent schemes. In the case of the mining shovel swing drive to improve the accuracy of the model somewhat different from the conventional structure of mechanical parts is used – namely, the equivalent three-mass two-motors system, the presence of natural damping and nonlinearity – backlash in gears and Coulomb friction.

The ducloped computer model using the automation of the modeling process, namely simulation modeling environment MATLAB-Simulink application with additional library SimPowerSystems, enabled to investigate the dynamics of the swing drive with regard to the presence of Coulomb friction and backlash in gearing, their initial values for each shaft including nonlinearities of the branch "thyristor exciter – DC generator". This model made it possible to explain the appearance of almost non damping vibrations of the mechanical parts of the two-motor drives.

This computer model was used for the research of the efficiency of damping mechanical vibrations into electric drive through different types of feedback.