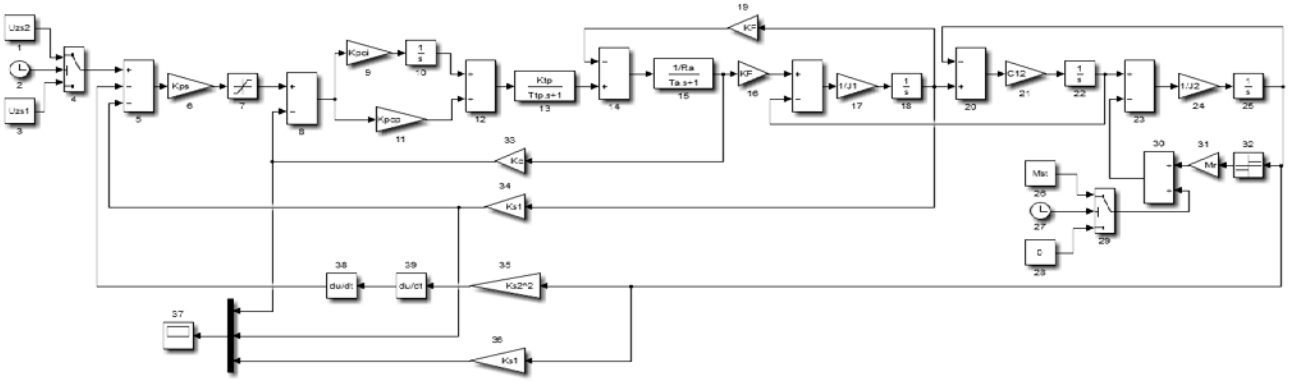
Viacheslav Horobets, Mykola Popytailenko
V.V. Styopkin, research supervisor
I.P. Nikitina, language adviser
National Metallurgical Academy of Ukraine, Dnipro

Model of One-Zone Direct-Current Electric Drive with Elastic Coupling

Introduction. The elastic mechanical links of machines drive, as energy accumulators, cause oscillations of its coordinates with deviation of processes from those specified by technology and the growth of loads on the transmissions and the electric motor. Dynamic loads of an oscillating nature do not allow the use of electrical equipment for overload capacity, significantly reduce the service life of node and components of mechanical transmission for wear resistance and endurance [1]. One of the priority directions of elastic mechanical oscillations active elimination is the synthesis of electromechanical systems with the realization of the damping action of the electric drive.

Objective. Development and research of mathematical model of one-zone electric drive with elastic coupling. To achieve this goal, the following tasks must be solved: calculation of regulators parameters, correcting and feedback of the electric drive; analysis of the influence of elastic coupling on the circuit current and circuit speed in a one-zone dual-circuit direct-current electric drive; adjustment of the speed contour of a single-zone electric drive with a system of subordinate regulation of parameters, taking into account the elastic coupling; synthesis and analysis of methods for correcting the system of subordinate regulation, taking into account the elasticity in the mechanical transmission.

Fig.1 – EMC modeling program considered in Simulink



Materials and research results. As an example the type P101 DC motor with the following parameters: rated voltage; rated current; rated speed; resistance of the anchor circuit; moment of inertia was used. With the type P101 motor, thyristor converter (TC) with constant was used. The overload capacity of motor. Value moments of inertia. Attenuating oscillation frequency system. The preferred ratio of

moments of inertia. Regulator current – proportional-integral (PI). Regulator speed – proportional (P). EMF is uncompensated.

Fig. 2 shows an example of the simulation program in Matlab package single-band electric DC elasticity of a mechanical transmission. Mathematical calculations made as m-file.

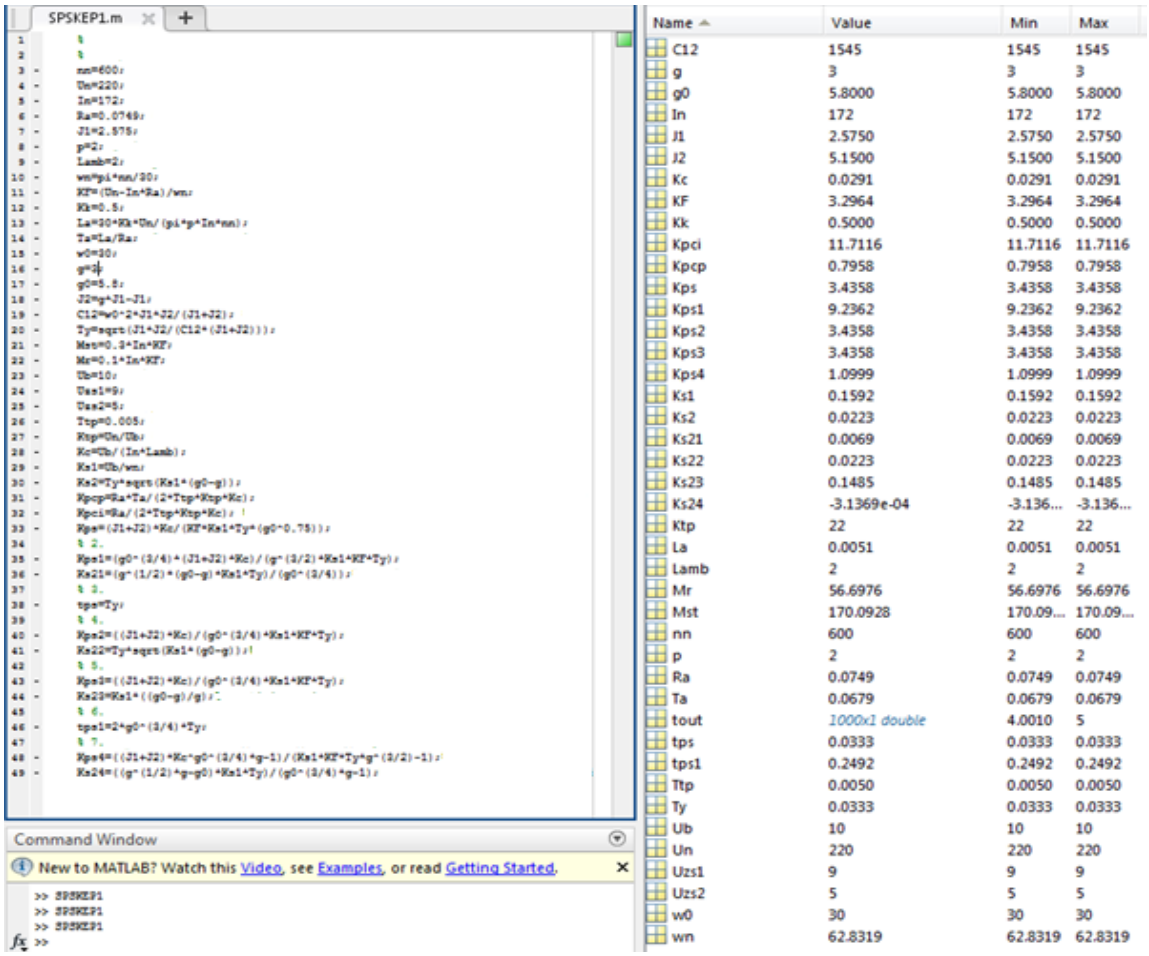


Fig. 2 – Calculations in the form of m-file in the Matlab package

Conclusions. If g = 3 ÷ 10 we must adjust regulator speed without including additional feedback. If g > 10, the best effect can be obtained by including additional feedback on the original motor speeds. If g = 1 ÷ 3 - to use additional feedback ES speeds.