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RESEARCH OF TRANSIENTS IN ELECTROMECHANICAL SYSTEM WITH UUG DISK TYPE

(ДОСЛІДЖЕННЯ ПЕРЕХІДНИХ СИСТЕМ В ЕЛЕКТРОМЕХАНІЧНІЙ СИСТЕМІ З ТИПОМ УГО ДИСКУ)

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Ця стаття присвячена розвитку електротехніки та електромеханіки та показує результати досліджень перехідних процесів в електромеханічній системі з дисковим типом UUG.

Ключові слова: *електротехніка, електромеханіка, електромеханічна система з дисковим типом UUG.*

This article is devoted to the development of electrical engineering and electromechanics and shows research results of transients in electromechanical system with UUG disk type.

Key words: electrical engineering, electromechanics, electromechanical system with UUG disk type.

The purpose of the work. Research of transients in electromechanical system with UUG disk type.

Introduction. One of the current problems in the development of electrical engineering and electromechanics is the development of electrical equipment for discharge-pulse technology of forming metal parts by shock wave pressure and hydraulic flow in discharge chambers filled with liquid during underwater electric discharge.

Capacitive drives are traditionally used to operate the equipment in pulse mode, which at energy consumption of $10^5 \ldots 10^6$ J have unsatisfactory specific energy consumption ($<10^4$ J / m3) and high specific cost (> 20 thousand UAH / kJ) [1].

Electric machine drives based on shock unipolar generators (UUG) have a simple design, relatively low cost and the highest among different types of electric machines energy density that accumulates in the rotating masses of anchors ($2 \cdot 10^7$ J / m3) [1]. However, for the implementation

of high-voltage pulses in the plasma load in the mode of dynamic braking UUG it is necessary to apply the scheme of the discharge circuit with the transformation of the pulse parameters (Fig. 1).

The study of transients in an electromechanical system with UUG disk type, the accumulated energy in the armature of which is converted into plasma energy of electric discharge and, ultimately, into the energy of shock waves. The scheme of the discharge circuit with compression of a low-voltage pulse of the UUG discharge lasting 10^{-2} s, energy intensity $10^5 \ldots 10^6$ J per high-voltage pulse in a load of voltage up to $2 \cdot 2 \cdot 10^4$ V lasting 10^{-5} s due to the use of two-stage switch S2, S3 and inductive drive is considered. energy (INE) [2].

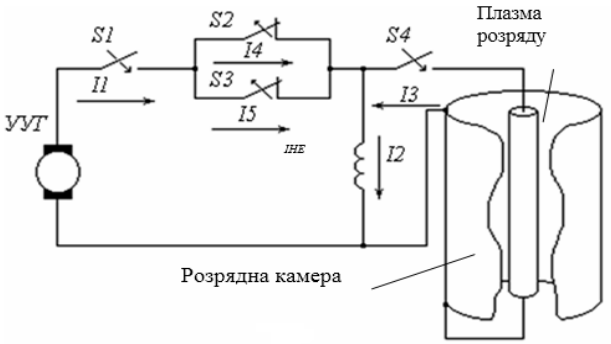

Figure 1 - Scheme of the discharge circuit with UUG

The peculiarity of the mathematical model is that to substantiate the technological process it is necessary to obtain spatio-temporal characteristics of the pressure distribution in the discharge chamber, and therefore take into account the mutual influence of electromechanical processes in the electric machine, electrical processes in the discharge circuit, electromagnetic, thermal and hydrodynamic. fields in the discharge chamber [1].

The solution lies in the numerical analysis of a closed mathematical model of magnetic hydrodynamics, in which the equations of electromechanics and the discharge circuit are boundary conditions.

Conclusion. The transients in the discharge circuit and in the discharge chamber testify to the promising use of the electrical system with UUG in the discharge-pulse technological processes of forming large metal parts. Based on numerical simulations, the initial data for the design of a prototype of an electrical system are obtained.

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