HYDROPULSE SYSTEM WITH POWERFUL PROTECTION OF MINING MACHINES FROM FLUCTUATIONS

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Purpose. Improvement of the structure, definition of rational parameters of the transient devices of the hydraulic pulse system (HPS) and evaluation of the efficiency of the use of repulsive clusters (RC) for vibration protection of base machines.

Methodology. Experimental studies and mathematical modeling of the oscillation process by finite-difference method investigated the energy processes in the cycle of HPS work and justified characteristics of the RC, providing a powerful protection for the base mining machine.

Conclusions. Experimental research on a special stand using the substance of the LCD as a "hydrophobised silica gel"(“Symetry C8/ Waters) with a highly developed internal surface + water as a working fluid "in a special container (50x23x8) mm, which has undergone degassing with the removal of a mixture of air with the process fluid in the cartridge of the cartridge AMG-40 mineral oil, the working hysteresis characteristic of the dissipator dissipating energy is established about 93%, which is typical for low-frequency oscillations and tests with pulsed loads - about 90%.

The mathematical modeling by the finite difference method confirmed the damping of oscillations with a decrement of 1.8-1.95 in the transient device with RC. The developed hydraulic multiplier with RC, based on hydrophobic silica gel, tested in a real hydraulic drive and recommended for the introduction in the designs of hydropulse systems of mining machines.

The research is carried out according to the budget theme: "Energy technology complex with intelligent control of working mode and vibration protection using reculsion clathrates" (№ДР 0115U002332),

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References

1. Impact machines for the destruction of rocks / D.P. Lobanov, V.B. Horowitz, E.G. Fonberstein and others. M.: Nedra. 1983.-152 p.

2. Chuprov I.V. Interrelation of specific energy of destruction of a rock with energy of a single impact // Izvestiya Vuzov. Mining journal. - 2004 - №5. P.66-69.

3. Saginov A.S. Theoretical foundations for the creation of hydroimpulse systems of shock bodies of machines. Saginov, I.A. Yatsen, D.N. Eshutkin, G.G. Piven. Alma-Ata: Science, 1985. 256 p.

4. Investigation of the interaction of tools and rocks during impact destruction / E.V. Alexandrov, V.B. Sokolinsky, G.M. Zakharikov et al. - Moscow: IGD them. A.A. Skochinskogo, 1967. - 62 p.

5. Slidenko V.M. Mathematicians modulation of shock processes of hydropulse systems of mining machines: monograph / V.M. Slidenko, O. M. Slidenko -NTUU "KPI" , 2017. - 220 p.

6. Eroshenko V.A. A new paradigm of mechanical energy dissipation. Part 1: theoretical aspects and practical solutions // J. Proc. of mechanical Engineers, Vol. 221. Part D: J. of Automobile Engineering. - 2007. - Vol. 221, No. 3. - P. 285-300.

7. Eroshenko V.A Power dissipation of the energy of oscillations of mining machines by heterogeneous leiophobic systems / Eroshenko V.A., V.M. Slidenko, S.P. Shevchuk, V.P. Studenets V.P.: NTUU "KPI", 2016 -180 p.

8. Ivanov A.P. Dynamics of systems with mechanical collisions / A.P. Ivanov .- Moscow: International Program of Education, 1997. – 336 p.

FEATURES OF THE PROCESSES OF FORMING AND SINTERING OF POWDERED THERMOMAGNETIC MATERIALS ON THE IRON-NICKEL BASE WITH CHROMIUM ADDITIVES

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Purpose. Investigate the influence of chromium addition on the demagnetization temperature and Curie point of powder metallurgy thermomagnetic materials by determining the breakout force of its sample from a permanent magnet.

Methodology. The studies were carried out through the investigations of processes for the formation and sintering of powdered thermomagnetic materials on the iron-nickel base and the determination of the breakout force of its sample from a permanent magnet on a laboratory stand.

Findings. With an increase in the concentration of Cr, the difference in breakout force from a permanent magnet increases and at concentrations of Cr 6 - 8 wt. % reaches the maximum value. On this basis, the optimum content of Cr is in the range of 6 - 8 wt. %. The dependence of the density on the temperature of sintering shows that when the temperature rises from 1200 to 1350 ˚C, the density of the samples also increases, and the porosity decreases significantly. This indicates a greater completeness of the processes of alloying. The highest density of the alloy is 7.01 g/cm^3, at the temperature of 1350 ˚C. When the temperature of sintering increases, the amount of the new phase - a triple solid solution decreases. In the temperature range of 1200 - 1300 ˚C, this phase is distributed evenly throughout the sample volume, and in the temperature range 1300 - 1350 ˚C