NEW GENERATION OF DISK EMG (PROJECT OF MIDDLE-CLASS DISK EMG)

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Disk explosive magnetic generators (DEMG) were proposed by V. K. Chernyshev in 1961. Research in 1970–1980s resulted in the creation of the DEMG of POTOK family with explosive charges of 250, 400 and 1000 mm in diameter [1].

The experience of twenty years of operation allowed V. K. Chernyshev and V. V. Vakhrushev to formulate further directions of development of the DEMG design, i.e. transition from profiled to flat disk elements [2].

To date, this path has been used to realize a new generation of small-class DEMG [3] and the work has begun on the development of a middle-class DEMG.

The paper discusses the large-scale parameters of transition from tested small-class DEMGs to middleclass DEMG (400 mm in diameter). The expected parameters of current pulses at operation on inductive load directly and with the use of a foil electrically-exploded current opening switch are estimated.

The prospects of achievable pressures in the experiments on investigation of shock and isentropic compressibility of substances are presented.

The results of experimental verification of the performance of key elements of a middle-class DEMG are given:

• a source for initial flux generation based on a 600 mm diameter helical EMG;

• of a scale model of a middle-class DEMG consisting of 5 disk elements,

as well as the results of preliminary testing of a middle-class DEMG consisting of 30 elements.

References

1. Chernyshev, V. K., Protasov M. S., Shevtsov V. A., et al. // VANT. Ser. "Mathematical Modeling of Physical Processes". – 1992. – No. 4. – C. 33–41.

2. Chernyshev, V. K., Vakhrushev V. V., Mamyshev V. I. // International Workshop "Hydrodynamics of High Energy Densities" : proceedings ; ed. by G. A. Shvetsov. – Novosibirsk. – 2004. – C. 224–228.

3. **Duday, P. V.** Disc Explosive Magnetic Generators of a New Generation [Text] : reports of the Russian Academy of Sciences. Physics. Technical Sciences / P. V. Duday, A. A. Zimenkov, A. V. Ivanovskiy et al. – 2021. – Vol. 498. – P. 7–10.